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ATTENTION AND DISABLED READERS:
A TOP-DOWN PERSPECTIVE

by

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ABSTRACT

A "cognitive" view of attention in reading was outlined as comprising both "bottom-up" and "top-down" processes. The conspicuous lack of reading investigations utilizing a "top-down" perspective was noted and a rationale for the significance of such an approach was given. Using the recent metacognitive and metacomprehension literature as a basis, an investigative plan for the examination of attention in reading from a top-down perspective was formulated.

This was subsequently integrated with Vygotsky's (1963, 1978) zone of potential development theory to provide the framework for the present investigation. The specific purpose of the present study was to determine whether older disabled readers rely upon "top-down" attention organizing strategies to the same extent as average readers, and if differential instructional conditions to promote the self-regulation of such strategies would improve their reading proficiency.

Sixty average grade five and 60 reading disabled grade seven students, matched for reading grade level, were randomly assigned to one of four instructional conditions (15 average and 15 disabled readers in each condition). Over all conditions, the Japanese folk tale "The Dragon's Tears" was utilized for the experimental silent reading task. Subjects in the incidental condition were given unexpected story recall, whereas subjects in the three intentional conditions were notified that they would be asked to retell the story prior to their reading of it. In the intentional instructional condition, subjects were simply notified of the recall task. Planned intentional subjects were additionally interviewed beforehand to

orient their self-awareness of strategies typically used for specific reading purposes and to self-generate a plan for maximal performance on the experimental task. For the trained intentional condition, subjects were given four, 45-minute sessions of instruction and practice on the use of a specific metacognitive reading strategy (SQ3R approach), and were directed to use the same approach for their reading of the experimental story. All subjects were asked to answer ten experimenter devised comprehension questions following story recall.

The recall results indicated that average and disabled readers were similarly inclined to remember information most important to the overall story structure (level 3 and 4 idea units) over information less central to the story structure (level 1 and 2 idea units). Although the general hierarchical pattern of recall (level 1 = level 2 < level 3 < level 4) was maintained over learning conditions for both groups, the total recall amount improved substantially over conditions for disabled readers. The initially inferior recall performance of the disabled readers in the incidental condition was improved to the extent of no differences in recall under intentional and planned intentional instructional conditions, with the trained intentional condition resulting in superior recall performance over average readers. For average readers, no differences in recall across conditions were found. It was suggested that the Brown's levels of idea unit paradigm was a useful and flexible means for the examination of the interaction of task, subject and context variables and recall of text. However, additional measures such as comprehension performance

could extend the informational value of future investigations.

Significant increments in comprehension performance for disabled readers were noted in the present study for planned and trained intentional subjects over incidental and intentional condition subjects. As was the case for recall, no differences for average readers on comprehension across conditions were apparent. The differential pattern of improvement of recall and comprehension performance for disabled readers was noted, and it was suggested that both processes contribute differentially to overall reading proficiency.

It was concluded that future general models of attention, as well as specific models of attention processes in reading, should include the "cognitive" or "self-regulative" aspects of attention, in addition to traditional components. Accordingly, there is a need for the establishment of a generative research base to thoroughly explore how the cognitive aspects of attention operate, and how these relate to overall attentional proficiency. Further work is also needed to explore how attentional processes affect the recall versus comprehension of stories in reading.

The findings additionally lend support to the zone of potential development theory, and it was suggested that the framework was particularly useful for the examination of basic learning processes of both exceptional and normal learners. Differential instructional conditions were seen to provide information regarding both theoretical and applied concerns.

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CHAPTER 1

INTRODUCTION

In comparison to any other area of exceptionality, learning disabilities is unique for its characteristic diversity of disciplines and theories relative to definition, identification and instruction. Lerner (1976), in a discussion of this cross-disciplinary approach, pointed to the medicine, language, education, and psychology professions as being directly involved in working with learning disabilities, as well as the less direct involvement of a number of other professions such as optometry, audiology, social service, physical therapy, genetics, biochemistry, guidance and counseling, systems analysis, clinical administration, etc.

While some might suggest that such a situation has yielded a greater understanding of the nature and remediation of learning disabilities, others would argue that the interdisciplinary approach has resulted in a state of chaos due to the confusion of terminology and a seeming conflict of ideas of the diverse professions.

From the perspective of an educator or an educational psychologist, it would appear that both of the above points are in part correct. For example, in the early 1960's when teachers were confronted head on with the reality of learning disabled in their classrooms, they were able to appease some of their frustration by relying on the medical model for identification and labeling of specific learning disorders. On the other hand, as teachers strove

to find specialized applied techniques for teaching the ever increasing numbers of identified learning disabled children, they were often misled or confused by the highly technical literatures, and the oft times, biased orientations of authors representing other professions.

Although we have benefited greatly by the diverse and plentiful investigations in the area of learning disability, researchers have become increasingly sensitive to the need to sort out those factors which might be primary to the condition of learning disability and how the problem could be remediated (Myklebust, 1971; Cruickshank and Hallahan, 1975; Lerner, 1976). A classic effort in this regard is Torgesen's (1975) review of the problems entailed in the study of learning disabilities. He suggested that "The problems of defining the subject of study, establishing proper goals for research, and understanding the concept of ability deficit" (p. 387) were the major factors that needed clarification to bring order to the chaotic state of research at that time. However, five years later, the field remains in a state of confusion.

It would be wrong to suggest that the efforts of Torgesen (1975) and others were of no value. It might, however, be argued that the approach that was taken to resolve the problem was too generalized to be of value for any one particular discipline. In other words, the three areas that Torgesen (1975) outlined would differ substantially for the medical doctor, the educator, or the psychologist; yet all three disciplines would agree to the apparent need for a clarification of such issues. Therefore, it seems logical to suggest that researchers examine their specific disciplines to determine the issues most relevant

to clarification of existing research, as well as to provide a broad framework for essential factors to consider in the planning of future investigations.

In view of recent research in the area of child development, there appear to be three major issues that are central to research on learning disabilities from an educational perspective. These are definition, structural versus control processes and ecological validity.

Definition

The problems surrounding the formulation of an acceptable definition of learning disability have been recognized in the past (McCarthy and McCarthy, 1969) and continue to defy ready resolution in the present day literature (Artley, 1980; Lerner, 1975; Ohlson, 1978). According to McCarthy and McCarthy (1969) the definition selected will determine the terminology to be used; the number of persons who may be so categorized; the criteria for selection; the characteristics of the population; as well as the type of intervention and subsequent remediation that will be chosen. Johnson and Morasky (1980) suggest that the cross-disciplinary approach that is central to the learning disability area makes it even more difficult for the representative disciplines to reach a consensus with respect to an appropriate definition, and as a result "overlap and interdisciplinary ignorance cause expensive, wasteful and inefficient duplication" (p. 55).

Probably the most serious hindrance to the formulation of an appropriate definition of learning disability is the confusion that results by somewhat indiscriminant use of generic versus specific terms

in defining our populations or research samples (Artly, 1980; Lerner, 1975; Douglas and Peters, 1979). For example, terms such as reading disabled, dyslexic, hyperactive, and minimal brain dysfunction can all be classified under the general label of learning disability, and often times one label or another is used interchangeably. The major problem with this is that there are specific characteristics or assumptions attached to each label and the adoption of such associated assumptions can vary from one professional area to the next. When any such label is utilized, assumptions about remediation, cause, and/or treatment are established. Artly (1980) points to a problem that occurred in the late 1960's when the U.S. funding agencies adopted a definition of learning disability which included the criterion of "exhibiting a disorder in one or more of the basic psychological processes." The crux of the problem was that

> Unless there was a clearly defined medical history, a record of disease or accident that could be indicative of a disorder in the basic psychological processes, there was no way of saying definitively that a child was learning disabled. Certainly there was no test administered in a school setting that could be used. As a result, the diagnostician had to rely on behaviors assumed to be causal factors. But the behaviors assumed to be indicative of psychological disorders were the same ones, in varying degrees, that could be found among children who were excluded by the definition. (Artly, 1980, p. 120)

Unfortunately the confusion is by no means reduced by using more specific labels such as dyslexia. Rutter (1978), after a thorough review of the research concerning dyslexia, concludes that the term

> constitutes a hypothesis regarding the supposed existence of a nuclear group or groups of disorders of reading and/or spelling caused by constitutional factors, probably genetic in origin. Or, alternatively, it refers to a more heterogeneous group of reading disabilities characterized by the fact that reading/spelling attainment is far below that expected on the basis of the child's age or IQ. (p. 27)

Another dimension that has only recently been alluded to in the literature is that of not only specifying the characteristics of the sample investigated, but the need to specify the task variables that are also operating (Krupski, 1980). For example, Vernon (1979) has argued that a great deal of our confusion with regard to the reading disabled is due to the fact that we treat our samples as though they form a qualitatively homogeneous group, and compound this error by treating reading as a unitary process. He suggests that it is far more conceivable that different readers may encounter difficulty at different stages of reading skills acquisition and that such difficulties may be causally related to distinct deficiencies in conceptual thinking.

Although only a few of the definitional problems concerning learning disabilities have been briefly and selectively outlined here, it is clear that the issue should be carefully considered by all researchers in this area. Probably the most direct manner in which some of the confusion can be resolved is by providing detailed accounts of sample characteristics, a rationale for selection, and a careful analysis of what processes and subskills are involved in the experimental task.

Structural versus Control

The distinction between structural features and control processes was first introduced in the memory study literature (Atkinson and Shiffrin, 1971), but has subsequently gained notable prominence in the developmental literature (Brown, 1975) and particularly in the literature pertaining to the handicapped (Butterfield

and Belmont, 1975; Brown, 1974; Torgesen, 1978). According to Torgesen (1978), "the structural features have to do with the basic capacities of the system and perhaps how rapidly the processes are executed, while the control processes describe activities which the organism engages in to maximize the performance of a limited capacity system" (p. 61). When the distinction is applied to handicapped groups, the structural features can be considered as those which are more or less permanent (i.e., disability or deficit) or those which are developmentally determined. Control processes refer to any processes, strategies, or metacognitive abilities within the child's repertoire of resources that he can rely upon in a learning or problem solving situation. The utility of the distinction is advanced by Brown (1974) who points out that structural features are of interest to those who are concerned with the labeling (causal) or identification of special groups, whereas the control processes are of interest to those who are more practically concerned with how to improve or remediate the problem.

In the field of learning disability, interest concerning structural features has focused on a deficit (Dykman et al., 1971; Black, 1973) or a developmental lag (Boder, 1971; Critchley, 1975) orientation.

Very briefly, a deficit approach is one which favors the view that there is some specific causal factor (i.e., genetic, neurological, brain damage) that is directly responsible for the impaired functioning of the individual. Here the attempt is to explain the basis of the impairment. On the other hand, a maturational lag approach is one which emphasizes the fact that learning improves with age and maturity

and often the disability is apparent in only one or two subject areas such as reading or math. In the latter case, the problem is considered structural in that the ability of the learning disabled to perform on certain tasks is developmentally constrained. What Gallagher (1966) proposed to account for these facts was the notion of developmental imbalance. The assumption being that development has "lagged" behind in specific areas and manifests itself in an inability to perform certain tasks.

The problems associated with either approach have been widely debated in the study of mental retardation (Zigler, 1969; Ellis, 1969) and are equally problematic in the study of learning disabilities (Dalby, 1979). Though too detailed to include in the present discussion, it is sufficient to point out that both of the above approaches represent a view of the learning disability as relatively long lasting or permanent, and predominantly insensitive to remediation.

In contrast to a structural approach, control processes are of much greater interest to researchers who are concerned about practical applications as well as to educators involved in remedial training of learning disabilities. The concept entails a variety of metacognitive dimensions (Brown, 1978) such as metamemory and meta-attention; all of the strategic interventions which can be imposed on a task or problem solving situation which will optimize the performance of the individual. Although the area is still in its infancy, the results of memory investigations and various training studies (Belmont and Butterfield, 1971; Moely and Jeffrey, 1974; Brown, Campione and Murphy, 1974, 1977; Brown and Barclay, 1976; Bray, Justice, Ferguson

and Simon, 1977) present exciting possibilities in the sense that we can carry out investigations to specify those processes that work optimally for specific tasks for normal and handicapped children, and ultimately provide relevant training for the handicapped youngster to improve his/her performance.

Diverging somewhat from Western theory and research orientations, Soviet studies have traditionally combined both the structural and control concepts. Vygotsky's (1963, 1978) theory of the zone of potential development involves the determination of at least two levels of a child's development which define the "correct relation between the course of development and potentiality for learning in each specific case" (Vygotsky, 1963, p. 28). At the first level, the zone of actual development represents those mental functions that have been attained due to a specific or already accomplished course of development (i.e., structural). The second level, the zone of potential development, represents a learning potentiality that may become actualized under the direction of adult guidance, demonstration or questioning (i.e., process). A major assumption of this theory is that the interaction of the individual with his older peers or adults constitutes the initial stage of learning. As the child gains more experience and practice, he begins to specify his own plans for carrying out a task; assuming increasing self-control and relying less on others to provide assistance. Thus, learning precedes development and "it presupposes that the one is converted into the other" (Vygotsky, 1978, p. 91). The importance of Vygotsky's theory has recently been acknowledged in American research (Brown, Campione and Day, 1981; Brown and

French, 1979; Wertsch, 1979; Lupart, 1978a) and the possibility of direct application and utility for the study of learning disabilities has already been identified (Brown and French, 1979).

Ecological Validity

There is a growing concern regarding the apparent division between research and the real life needs and contexts of the people that we are studying (Brown and French, 1979); and the problem is probably most obvious when handicapped populations are considered (Brooks and Baumeister, 1977; Gaylord-Ross, 1979). Within the realm of cognitive science, Brown and French (1979) sagaciously point out that efforts have mainly been directed toward the understanding of problems of academic intelligence. For example, other than being able to fairly accurately predict the school failure of the slow learning and learning disabled, there is little else that our IQ tests and achievement tests offer. This negative orientation has undoubtedly biased both our research as well as our attitudes and treatment of the learning disabled. In contrast to the overwhelming evidence concerning what the learning disabled child cannot do or is deficient in, we know very little about what s/he can do in comparison to regular children, under what learning conditions s/he works best, and on what tasks. The latter concerns, it will be noted, are, of course, of much greater concern from an educational perspective.

These concerns are not new in the area of mental retardation study, and perhaps we researchers in the area of learning disability can benefit by the experience of our older sister discipline. Brooks

and Baumeister (1977), in a guest editorial, reviewed the historical progress of mental retardation research and concluded that despite a considerable amount of laboratory research in learning, memory and cognition, such efforts had yielded very little in the way of increased understanding of retarded behavior. The authors argue that the main contributing factor to this situation lies in the researcher's failure to consider the ecological aspects of the phenomenon of mental retardation in his investigations. Brooks and Baumeister (1977) further suggest that:

> Implications of ecological validity are important with respect to the basis upon which subjects are selected for experimentation, the rationale underlying manipulation of independent variables, the choice of dependent variables, and the definition of the boundaries that limit generalizations. (p. 407)

Following a comprehensive discussion of the major theoretical and methodological limitations of mental retardation research, Brooks and Baumeister (1977) provide some suggestions for improving the situation. These include:

> elaborating causal relationships in the theory, selecting subjects on more meaningful, valid grounds than the IQ score, employing tasks with demonstrated validity with respect to the theoretical construct, and defining constructs according to ecologically real factors in the lives of retarded people. (p. 415)

In support of the above position, Gaylord-Ross (1979) charges that much of the past mental retardation research has been too episodic and too narrow in focus. In the way of suggestion to alleviate these and the above research problems, Gaylord-Ross (1979) proposes a collaboration of researcher and field (i.e., school, workshop, residence) arguing that the arrangement would reap several reciprocal benefits.

In exchange, for example, the help a researcher could offer the teacher on evaluation techniques, the teacher could provide "a data-base indicating learning and cognitive processes in natural settings . . . [with] . . . hypotheses emanating from ongoing learning activities in the classroom" (p. 75).

It would appear that the concerns and suggestions emanating from mental retardation research have similar relevance to the study of the learning disabled. By taking into account some of the suggestions offered by mental retardation researchers, it is possible for the learning disability researcher to avoid the problems central to ecological invalidity.

In summary, it seems apparent that investigative efforts concerning the learning disabled could be of much greater utility, from an educational perspective, if the three conceptual issues, definition, structural versus control processes, and ecological validity, were consistently accounted for in the initial planning stages of one's research. This is, therefore, the overriding goal of the present study. Very briefly, the purpose of this study is to examine attention differences in learning disabled and average students in reading. Since the interest here is for those learning disabled students who have particular problems with reading in school, a definition for specific reading disability, as well as a rationale for subject selection will later be advanced. The process orientation will be emphasized in the proposed study and by providing learning condition variations, it is anticipated that information concerning the optimization of attention can be ascertained for disabled readers.

Average control subjects will provide information concerning the assumption that the optimization of attention is one important factor in the course of normal reading acquisition. In the interests of ecological validity, a silent reading task will be utilized. Since this type of an activity is commonly practiced in the schools, the results should also provide some direction concerning facilitative instructional conditions for remedial classes for the reading disabled.

CHAPTER 2

SELECTIVE REVIEW OF THE LITERATURE

Attention

What is It?

Most descriptions in the literature refer to William James and his very excellent work in the area of attention. The following quotation encompasses the flavor of his insights (James, 1890):

> Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one of what seem several simultaneously possible objects or trains of thought. Focalization, concentration of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others. (pp. 403-404)

Although the concept of attention has at times been relegated to the background of psychological investigation over this century, there is an apparent reemergent movement toward the study of attention.

Similar to the concept of learning disability, there is a problem in specifying just what attention is. To the teacher, attention is demonstrated by various behavioral responses of students; the physiologist might examine certain autonomic patterns to determine the external and internal attention of his subject; the clinical psychologist might refer to test results for indications of attention problems. The crux of the problem is identified by Mostofsky (1970) who suggests that: "attention, implying as it does multivariate considerations of process (attentional), subject (attentive) and stimulus (attention-getting) will require multidimensional analytics" (p. 22).

Psychologists often refer to the components of attention as a useful and practical means of definition. Moray (1969), for example, suggested that there are seven different kinds of attentional processes which include vigilance, selective attention, mental concentration, search, activation, set and analysis-by-synthesis. Posner and Boies (1971) refer to the alertness, selectivity, and processing capacity of attention, whereas Pribram and McGuinness (1975) organize their definition on the basis of the arousal, activation, and effort components of attention.

For the purposes of this study, there appear to be two aspects that are particularly meaningful to the study of attentional problems associated with the older disabled reader. These would include the cognitively directed aspects of attention (Hochberg, 1978; Neisser, 1967) and the interactive aspects (i.e., task and learner characteristics of attention) (Krupski, 1980). The basis for the selection of these specific aspects of attention will be established in the following sections.

Theories and Models of Attention

The most widely accepted model of attention, following the banishment of James' introspective techniques by the behaviorists and associationists, is the filter theory model. Introduced by Broadbent (1958), the model assumes that only one stimulus can be perceived at a time and that in the case of two competing bits of sensory information, while the one item is immediately perceived the other is held momentarily as an unanalyzed echo or image. Only after the perceptual analysis of the first item is completed can such

echoes and images undergo perceptual analysis. The model, then, suggests a blocking off of irrelevant perceptual information by means of selective filtering, in order that physical properties of high information value concerning the event are those which get attended to. Subsequent to the introduction of the filter model various theorists and researchers have presented experimental results to refute the original model (Triesman, 1964) and elaborations and modifications of the model have been advanced (Deutsch and Deutsch, 1963). The major adjustments concern whether the information gets selected early or later on in perceptual analysis and whether the selection is based on physical or meaningful information about the event (Norman, 1976).

Very recently, Douglas and Peters (1979) have outlined a very poignant attack against all filter theory models on both empirical and theoretical grounds. They point out that over the last two decades there has been considerable investigative effort given to distractibility studies and incidental learning studies with hyperactive and learning disabled children. Following a filter theory of explanation, the accepted belief is that these special populations have an attentional deficit which limits their ability to block off irrelevant information. After a review of several such distractibility studies, Douglas and Peters (1979) conclude that there is no conclusive evidence to support a distractibility hypothesis, particularly for hyperactive samples. In addition, the authors suggest that all experimental results from distractibility studies should be examined with caution for the following reasons (Douglas and Peters, 1979):

> First, there are no studies in which carefully defined groups of LD, hyperactive, and normal children have been compared directly, using the same tasks and the same

distracting and nondistracting condition. . . .

> A second problem . . . involves the possible effect of statistical artifacts such as may arise, for example, if the scores in hyperactive samples are unusually variable as compared with the scores of other groups. . . . It is also essential to eliminate errors in design resulting from failure to counterbalance distraction and nondistraction conditions; . . .
>
> Another problem in interpreting the distracting studies with hyperactive and LD children results from the fact that investigators frequently fail to consider differences in baseline levels in task performance among groups to be compared. (pp. 170-191)

The situation is judged even more serious by Douglas and Peters (1979) with respect to the incidental learning studies with hyperactive and particularly with learning disabled children. Criticism is centered on the failure on the part of investigators to question the assumption that processing task-irrelevant information necessarily interferes with the processing of task-relevant information, as well as the assumption that the lower scores that are usually reported for LD children on central tasks in comparison with normal controls are wholly or primarily attributable to an inability to ignore relevant information. Douglas and Peters (1979) on the whole have convincingly demonstrated major methodological and theoretical pitfalls with investigations based on a filter model of attention, and it would appear that other researchers (Ross, 1976; Hochberg, 1978) concur with the conclusion that the theory should be laid to rest.

As an alternative to structural filter models of attention, capacity theories are based on the assumption that although there is an upper limit concerning the perceiver's capacity to process information, this limited capacity can be rather flexibly allocated

among a number of concurrent activities (Moray, 1969). Information that is essentially sensory or well recognized will be quite readily attended to, whereas semantic or unfamiliar inputs will require more "effort" or "capacity allocation" (Kahneman, 1973). Information processing failures or slow downs, then, occur when task demands exceed the limits of capacity; when insufficient capacity remains for task performance due to allocation of some capacity to less relevant inputs (Maccoby and Hagen, 1976); or as a result of insufficient input of relevant information (Posner and Snyder, 1975).

Capacity theories have achieved considerable status in contemporary investigations of attentional phenomena, and the popularity can be mainly attributed to the accountability of a wide range of experimental results, from RT performance to selective attention studies. Indeed the theory is also intuitively useful for accounting for the now all too familiar results which show significant learning and memory differences between children and adults. In essence, the theory simply suggests that younger children have less overall capacity to attend or to remember or to learn than do adults. Although the above description drastically simplifies what are generally comprehensive and elaborate models of developmental differences, the core assumption of capacity which increases with age (i.e., structural) is central to most.

It should be pointed out, however, that several sources in the recent memory literature (Chi, 1976) point to serious theoretical limitations of a capacity model of memory. Beginning with the attack by Craik and Lockhart (1972) concerning the inflexibility of a

capacity model to explain major areas of data inconsistencies, others have criticized the undue emphasis upon structural as opposed to control features of a memory system (Brown, 1975), or have noted how a capacity model biases the interpretation of experimental results to provide quantitative as opposed to qualitative explanations about memory performance (Lupart and Mulcahy, 1979). Given the strong objections to capacity theory on the basis of developmental memory studies, one would speculate as to whether similar shortcomings would not be attributable to the related attention studies. Not surprisingly, similar criticisms have recently appeared in the literature concerning the attentional development of children. Gibson and Rader (1979), for example,

> argue that attention is not a capacity that increases with development but, rather, that our perception changes with increasing knowledge of one-self and the world, allowing us to pick up the information more and more economically to perform a specified task. (p. 6)

While both the filter and capacity theories have served to generate a considerable amount of research, the failure to specify how attention is associated with learning and cognition appears to be a major shortcoming of both models. The above quotation alludes to what might be termed a "cognitive" approach to attention (Neisser, 1967). Even though the approach can hardly be described as a generative theory at this point, there appears to be a growing number of similar based approaches being described by several prominent researchers in the recent literature (Gibson and Rader, 1979; Douglas and Peters, 1979; Hochberg, 1978). The major strength of this approach is that, unlike the "filter" and "capacity" models of attention, the primary emphasis is upon how

attentional processes relate to cognition and cognitive development. Krupski (1980) has recently suggested that the approach be considered an interactionist view of attention since it deals with both task variables and child characteristics.

Presented as an alternative to filter theory, Hochberg (1978) views attention as "plan-matching" and schema-testing. He argues for the advantages of such a "cognitive" approach in that:

> It brings us a view of perception that builds intention and attention right into the heart of the perceptual process: Perception is the active prediction and sensory testing of expected objects and events, so that by its very nature perception is selective—by electing to test one possible expectation, it rules out many others. No additional mechanism is needed to explain how we fail to hear what we do not attend to. (pp. 182-183)

In a similar vein, Gibson and Rader (1979) suggest that "attending refers to perceiving in relation to a task or goal internally or externally motivated" (p. 2). Within a developmental context, Gibson and Rader (1979) argue that:

> The child gains progressively in the specificity of correspondence between what information his perceptual processes are engaged with (what he is attending to) and its utility for performance in the service of his needs. He gains in flexibility because more alternatives become open to him. He gains in preparedness for events in readiness for performance. And he gains in how much he can do because of the increasing economy of his pickup of information. (p. 14)

The important points concerning a "cognitive" or "interactionist" view of attention are: attention is inextricably tied to cognitive development, and changes in attention (which traditional models of attention have insufficiently characterized as quantitative) are really very basic qualitative differences which maximize and optimize the attention of the growing child or adult. In other words, attention

begins to take on a strategic role in the child's learning processes and the child becomes increasingly adept at managing his own attentional processes. Douglas and Peters (1979) advance the concept one logical step further by suggesting that normal attentional functioning can be attributed to an individual's ability to utilize prior knowledge to guide the perception and cognition of present events as well as an ability to impose voluntary (i.e., conscious, intentional, deliberate) control over current perceptions and cognitions. Both of these considerations are integral to Brown's investigations and discussions of metacognition (Brown, 1978) and self-regulation (Brown and Deloache, 1977). According to Brown (1978) metacognitive skills are those which characterize and define efficient thought and include a wide variety of potential attentional organizers such as predicting, checking, monitoring and reality testing. Whether these are collectively or only partially applied, these are some of the skills that typify and dominate any person's learning and problem solving.

The self-regulation concept can be quite flexibly applied to both young children or novices (and it might be added, to students with learning problems). In an attempt to describe the typical pattern of the process from novice to expert Brown (1978) contends that:

> First the absolute novices would show little or no intelligent self-regulation due to complete unfamiliarity with the task. This would be followed by an increasingly active period of deliberate self-regulation as the problem solver becomes familiar with the necessary rules and subprocesses, and attempts to orchestrate these activities which are deliberate and demand effort. Finally, the performance of the expert would run off smoothly as the necessary subprocesses and their coordination have all been overlearned to the point where they can be coordinated relatively automatically. (p. 20)

It should also be pointed out, that there is a natural compatability of those ideas to the zone of potential development framework, discussed in an earlier section. As Douglas and Peters (1979) describe it:

> Thus, the distinction that Brown (1975) and Vygotsky (1962) make between knowledge that can be acquired in a relatively automatic, unconscious way and knowledge that must be self-consciously and deliberately sought may be very relevant for an understanding of these children's cognitive strengths and weaknesses. (p. 231)

Given this perspective, it is then possible to view the attentional problems of the learning disabled as an inability to spontaneously impose self-regulatory attentional strategies on school related tasks in particular. According to Brown (1975) the problems become most notable when a child is faced with school tasks in which no obvious purpose is clear to the child. In other words, even though two young students may have the same IQ and mental age, the child who has an attention deficit fails to adopt effort maximizing attentional strategies to cope with school tasks and his academic achievement suffers as a result. From a zone of potential development perspective, special training or adult tutoring should enable the learning disabled child to reach his zone of maximal development.

In general, although the above descriptions are for the most part atheoretically based upon empirical data, the interactionist view of attention holds considerable promise for the purposes of this study. The concept of attention that this study will adhere to is one that is task specific; is dependent upon the subject's ability to flexibly allocate attention to achieve optimal and efficient information processing; is purposive in nature; is positively affected by increased self-regulation; is dependent on organized perceptual intake

based upon cognitive determination; and can be improved through training.

Before turning to a discussion of the relationship of attention and reading, some apparent controversies concerning learning disability and attention deficit will be briefly presented.

Learning Disability and Attention Deficit

There are two approaches to learning disability and attention deficit which appear to have gained the greatest prominence in the literature. The approaches are quite different in theoretical and methodological orientation and the following brief descriptions will reveal some of the major discrepancies among approaches.

Douglas and Peters (1979) have recently outlined a model which suggests major differences in attention problems for hyperactive and learning disabled children. The former group are "born with a constitutional predisposition involving poor impulse control, an inability to sustain attention and poorly modulated arousal levels which result in a tendency to seek stimulation and salience" (p. 233). Such problems are considered to cause major interference with the development of meta processes and over the years the initial problems are compounded with other behaviors such as task-avoidance or disruptiveness. Learning disabled children, on the other hand, have a primary deficit involving "a constitutional predisposition toward one or more specific learning disabilities" (p. 233) (i.e., receptive language problem). This could, it is hypothesized (Douglas and Peters, 1979), lead to "pseudo" or "secondary" attentional problems such as impulsivity or concentration difficulties, and thereby affect both the normal meta process development and the development of higher order

schema, as outlined by Brown (1975) in her discussions of metacognition. The distinction that is made here is based on several years of investigation by the first author and the work of several of her graduate students. Douglas and Peters (1979) further conclude that the treatment of the hyperactive group should focus on a "cognitive" approach (i.e., self-verbalization, modeling and self-reinforcement) to resolve attentional problems associated with arousal and meta cognition deficits. For the learning disabled, they suggest that remedial efforts would more suitably be directed towards the student's original learning deficit.

The second approach to learning disability and attention deficit to be discussed here is that outlined by Ross (1976). On the basis of a major review of the literature as well as his own research, Ross (1976) hypothesizes that attention deficits in the learning disabled are due to a developmental lag in the capacity to employ and sustain selective attention. Referring to both incidental learning and developmental studies, Ross (1976) describes infant attention as overexclusive; gradually becoming overinclusive as the child displays increasing attention to a great variety of stimuli. It is not until near adolescence that "mature" selective attention is demonstrated by one's ability to focus on the task relevant stimuli. With regard to the issue of remedial intervention, Ross (1976) examines both the notion of impulse control or adaptive attentional strategy training. He concludes that the impulsivity that is often ascribed to the learning disabled is really a learned reaction to failure experiences due to the basic problems manifested by an insufficient

capacity to manage selective attention. Therefore, Ross (1976) favors a cognitive training method to teach "the attentional strategies required to solve cognitive problems" (p. 121).

The two approaches outlined briefly above present a major conflict with respect to our current understanding and treatment techniques for the learning disabled child. In an attempt to resolve the discrepancy, the present research will consider the question: Are cognitive "adaptive attentional strategy training" techniques appropriate for all learning disabled children (Ross, 1976) or are they only appropriate to enhance the learning and problem solving of the hyperactive child (Douglas and Peters, 1979)?

Attention and Reading

The Reading Process, Perception and Attention

The process of reading can be conceived of as an act of information processing. Information processing in humans is uniquely concerned with the acquisition of knowledge. Fishbein (1976) suggests that there are six general interrelated characteristics of a human learning system:

1. the reception of information
2. the identification of information
3. the storage of information
4. the operation on or elaboration of information
5. making decisions about information
6. acting on the decisions made about the information. (p. 207)

Many of the researchers in the area of perception would combine the first two characteristics to define perception. Gibson (Gibson and Levin, 1975), who has for a number of years attempted to discern the

relationship between perceptual learning and reading, defines perception as "the process of extracting information from stimulation emanating from the objects, places and events in the world around us" (Gibson and Levin, 1975, p. 13).

With respect to the process of reading, the close interrelationship between perception and attention processes has been acknowledged as early as the turn of this century. Huey (1908) wrote:

> Perceiving being an act, it is performed more easily with each repetition . . . to perceive an entirely new word . . . requires time and close attention . . . repetition progressively frees the mind from attention to details, makes facile the total act, shortens the time and reduces the extent to which consciousness must concern itself with the process. (p. 104)

However, there is considerable disagreement as to how this relationship is defined.

Gibson and Levin (1975) surmise that the crucial attentional processes with respect to reading include the ability to ignore irrelevant information and the ability to effectively utilize the peripheral mechanisms of attention. The former process implies that one must be able to visually discriminate between stimuli. Allington (1975) proposes that the development of such differential responding involves first learning to attend to the distinguishing feature(s) of a stimulus, and second, learning to quickly identify and remember the feature(s). Even though Laberge and Samuels (1974) would agree with Allington's (1975) delineation of the two stages, their notion of the role of attention in the reading process implies a quite different perspective. Laberge and Samuels (1974) suggest that there are both an accuracy level of performance and an automatic level of performance

that affect the reading process. Attention is presumed necessary only for the accuracy level of performance. The rationale for this point of view is elaborated by Samuels (1976). Here, Samuels (1976) suggests that the brain is a single channel processor, and thus a person can only be attentive to one piece of information at a time (i.e., filter model of attention). With regard to the reading process, Samuels (1976) suggests that with repetition and increasing experience, a behavior that formerly required effort and attention would eventually become more or less automatic and could be executed without attention. Therefore, if we were to conceptualize the reading process as a combination of decoding and processing meaning, Samuels (1976) suggests that the immature reader must devote most of his attention to the decoding aspects, which thereby greatly limits comprehension. Alternatively, the mature reader, for whom decoding skills have become "automatized," can devote the time to processing meaning.

In view of the earlier discussion on models of attention, a more plausible explanation is advanced by Wright and Vlietstra (1975) who, in contrast to Samuels (1976), assert that attention is a necessary component of all information processing, although qualitative differences are apparent. By this, it is postulated that attention is initially controlled by salient features of stimuli, and later controlled by logical features of the task. This shift, then, proceeds from passively tracked to actively sequenced attending. In addition, Wright and Vlietstra (1975) suggest that:

> this developmental change appears to be marked by a transitional period in which the intentional and goal directed aspects of deliberate search are fairly well developed and the capacity of salient features to capture

> attention is no longer particularly helpful, even when such features are informative, but is still a major source of interference when they are distracting or irrelevant. (p. 196)

The latter part of the quotation demonstrates that Wright and Vlietstra's (1975) notion of the attentional process is consistent with those of Gibson and Levin (1975) who stress that one of the primary attentional processes in reading is the ignoring of irrelevant information. Wright and Vlietstra's (1975) views would of course also suggest that some of the approaches that we presently use to direct attention to distinctive features in reading (i.e., color cues) may be helpful only at the initial stages of reading acquisition.

Along with the discrimination of relevant versus irrelevant stimuli, Gibson and Levin (1975) suggest that the more proficient reader must effectively utilize the peripheral mechanisms of attention. The visual peripheral mechanisms of attention can be considered to be exploratory in function and are primarily associated with visual scanning or looking behavior. As Gibson and Levin (1975) describe it, the peripheral mechanisms of attention are responsible for exposing the receptors to selected aspects of potential stimulation and that the process is highly susceptible to learning and development.

In support of this view, Day (1975) in a major review of the literature has identified six developmental trends in visual scanning. Although the list is not specifically referenced to reading, it will become apparent to the reader the overall significance such development imparts to the reading process and thus justifies inclusion here:

> With increasing age children:
>
> 1. demonstrate more systematic, task appropriate strategies for acquiring visual information;

2. show an increasing ability to maintain optimal performance across variations in the content and arrangement of stimuli;
3. exhibit visual scanning which becomes more exhaustive and more efficient;
4. there is an increasing focus on the portions of visual stimuli which are most informative for the specific task;
5. there is an increase in the speed of completion of visual search and comparison tasks;
6. show an increase in the size of the useful "field of view." (Day, 1975, pp. 186-187)

In summary, it would appear that there are both structural (i.e., developmentally determined or constrained) as well as process (i.e., visual scanning and selective attention) limitations related to attention which would negatively affect the young child's (or it could be argued, the learning disabled child's) reading acquisition. In addition, attentional processes that are available are of limited utility until they can be performed automatically in the context of the reading process. The trend toward reading proficiency, with respect to attentional processes is referred to by Gibson and Levin (1975) as the optimization of attention.

The Optimization of Attention in Reading

There is considerable controversy in the field at present as to how the optimization of attention becomes actualized in the reading process. The distinction, it might be suggested, is generally parallel to that which comprises the "bottom-up" versus "top-down" theories of reading (Calfee and Drum, 1978). Norman (1976) describes a "bottom-up" or "data driven" view as "any sequence of operations that proceeds from the incoming data, through increasingly sophisticated analyses" (p. 41). As a leading proponent of the "bottom-up"

view of reading, Gough (1972) maintains that the reading process is a combination of several subskills which are initially awkwardly performed but through practise, become seemingly automatic and integrated as in the case of the proficient reader. Thus, Gough (1972) imparts that all readers must rely on the same skills in reading and differences in ability to read arise on the basis of the facility with which the reader is able to apply these skills to the visual information provided by the text. With respect to the role of attention in the perception of visual stimuli, Gough (1972) fails to make allowances for individuals other than the rate of reading. However, in view of the earlier discussion concerning the interrelationship of reading, perception and attention, it would indeed appear that any number of individual differences (i.e., attention to high information distinctive features, inability to ignore irrelevant information) might also account for differences in reading performance.

Norman (1976) refers to a "top-down" or "conceptually driven" system in which "visual signals might start with the highest level expectations of an object that is further refined by analyses of the context to yield expectations of particular lines in particular locations" (p. 41).

Goodman (1973, 1976), who is widely held to represent a "top-down" approach to reading, emphasizes the reader's active involvement in the reading process as he utilizes psycholinguistic knowledge to make predictions about the author's message. The implication with respect to visual perception is that for the reader to become more proficient, he must become increasingly discriminating in regard to

the graphic information, and search out or attend to only those stimuli that will facilitate the hypothesis testing or extraction of meaning. For Goodman (1969, 1973) it would seem then, that the search aspects of attention, as opposed to the exploratory aspects of attention, are most important in the process of reading.

Several suggestions would appear plausible with respect to the "bottom-up" versus "top-down" attentional processing in reading controversy. It would seem that Gough's (1972) views have greater relevance when we consider the allocation of attention for the beginning reader. On the other hand, Goodman's (1969, 1973) description of the reading process might be more aptly applied to the analysis of the attentional process of the proficient reader. Or it could be alternatively suggested that the controversy will never be satisfactorily resolved for one side or the other, and it is very likely that both systems simultaneously play an integral role with respect to the optimization of attention as other researchers have already suggested (Norman, 1976; McConkie and Rayner, 1976). The point that is, however, most crucial to the present discussion is that even though there appears to be wide acknowledgement of the importance of attention for both "bottom-up" and "top-down" processing in reading, the majority of reading studies concerning attention have primarily been based upon a "bottom-up" perspective (Lupart, 1978b). This may not be all that surprising considering the pressure during the last five decades from psychology to focus on measurable behavioral responses (i.e., visual scanning, eye movements, reaction times) and a traditional view of perception which emphasized stimulus reception

(i.e., symbol recognition, orthography, or tachistoscopic perception) as opposed to how children "learn to predict and anticipate what is coming next in reading" and "what the goals and the appropriate units are for the different intentions that initiate and maintain reading behavior" (Hochberg and Brooks, 1970, pp. 249-250). In other words, we know a lot about what a reader does attend to, but we do not know how or what determines how he guides his attention. In the following segment of this review, a summary of some of the work of the few reading researchers who are beginning to explore this potentially fruitful "top-down" perspective of attention in the reading process will be given. In addition, it should become quite apparent that the "top-down" approach to attention, as it is developing in the reading literature, is very similar and quite consistent with the "interactive approach" or the "cognitive approach" that was described in the earlier discussion of general psychological models of attention.

Reading as an Intentional Behavior

The logic for stressing a "top-down" approach to attention in reading is outlined by Hochberg and Brooks (1970):

> The reader does not merely regard a block of text and immediately realize its message. He must "intend" to read the display, must "pay attention" to its meaning, if he is able to respond to its contents. What a phrase like "pay attention to" might mean in this context has not received much thought or experimental research, but it would seem to be of fundamental importance to any understanding of what the reading process is all about. (p. 242)

The importance of an "intentional" or "planning" component to attentional processing in reading has recently been gaining increased

recognition (Hochberg and Brooks, 1976; Stauffer, 1977; Mackworth, 1977; Hochberg, 1976; Hochberg, 1978). Hochberg (1978) proposes that there are two interacting systems that affect our reading behavior: para-foveal or peripheral search guidance and cognitive search guidance. The former system (formulated on the basis of mainly eye-movement studies) must make optimal use of the information being picked up by the successive extrapolations of the fovea, while the latter guides the eye movement on the basis of anticipating what comes next. According to Hochberg (1978):

> The skilled reader is set for most of his glances before he perceives them so that his long-term memory is primed; and within each speech plan, he is testing a chunk that is already in short-term memory. He does not combine successive samples by adding each to the preceding one. Instead, he moves his eyes to test and fill out his expectations and formulate new ones. (p. 177)

In an attempt to explain just how the planning function relates to reading, as well as other such skilled actions as typing, Hochberg (1978) refers to the Miller, Galanter and Pribram (1960) Test-Operate-Test-Exit (TOTE) model, the unit of purposive, planned, sequential behavior. There are three key features to the TOTE model which Hochberg (1978) outlines and which are important to the discussion here. The first point is that there is a hierarchical progression in that:

> a part or detail at one level of analysis becomes a unit with its own parts at the next. . . . The second point is that perception, expectation (or "internal representation" or "image" of the desired state), intention and action are all intertwined in this analysis. The tests consist of comparison of the existing state of affairs (roughly, perceptions) with the desired state of affairs—i.e., with a particular representation of the world that is selected by the organism's goal or intentions. . . . The third point is that there are limits to how far down the analysis can go. (p. 181)

To the present line of discussion, the TOTE model as it is outlined would appear to be quite consistent with both a "top-down" and a "bottom-up" attentional view of the reading process. What is unacceptable, however, is the way that Hochberg (1976, 1978) applies this model to a "speech-plan eye-movement model of reading." In his discussion of Types 1, 2, 3 and 4 reading, Hochberg (1976), despite his intuitive acknowledgement of the importance of "top-down" attentional processing, relies on "bottom-up" experiments (i.e., eye movements or adjustments to the visual information) to back his statements. In fairness to Hochberg (1976) he acknowledges the limitations of his approach in stating:

> Perhaps the large regressive movement back to a word that the reader makes when he discovers later on that he must have misread the word (Geyer, 1966) is the closest we have come to a direct record of cognitive guidance in the course of reading. (p. 405)

Also, by making reference to a speech-plan view of reading, one might misinterpret Hochberg's (1976, 1978) notion of cognitive search guidance as one that is dominated by linguistic parameters rather than cognitive plans. The former linguistic perspective would be typified by the work of, for example, Vellutino (1977) who hypothesizes "that poor readers may have difficulty both in linguistic coding of incoming information and in the retrieval of linguistic referents associated with given stimuli" (p. 348). This view would, therefore, confine the cognitive search guidance attentional processing to the semantic, syntactic, or phonological components of the written text. In contrast, "top-down" attentional processing as defined in this research includes any of the executive, planning, or self-regulative

attentional strategies that the reader can impose on the reading situation to increase the efficacy of the performance.

In a more philosophical discussion of the role of intention in reading and thinking, Stauffer (1977) makes the notion of attention as cognitive search guidance quite clear:

> In brief, then, it appears that reading is a mental process akin to thinking or to state it differently, critical reading is akin to reflective or productive thinking. One must also allow for the fact that reading can be done for vague, unclear affective reasons and/or for unregulated thinking. Thus, reading can be done at various degrees of sophistication both for entertainment and learning. Likewise, thinking can be either regulated or largely unregulated. When reading to learn is required, the reading-thinking process must be productive. When reading for entertainment, the reading-thinking process can be largely unregulated, varying with the amount of involvement desired. (p. 52)

In corroboration with the above view, Mackworth (1977) makes the important distinction between the stimulus-bound versus self-ruled tasks in reading. In a stimulus-bound task such as monitoring another's reading, the person must simply match the spoken and printed patterns. According to Mackworth (1977) it:

> makes no great demands on the ability to use self-instructions to do the work . . . there is no need to use the verbal context to guess what is coming next . . . the rate of work is predetermined by outside environmental circumstances . . . is information processing with minimal opportunities to work with the stimulus input in anything but a standardized manner . . . is a more passive activity . . . Little is regulated in the way of prediction . . . The rules are there and already laid down. (p. 19)

The self-ruled task, which is what most reading situations for the proficient reader are, is quite the opposite of the stimulus-bound task. The self-ruled reading situation is one in which the good reader is more actively involved and establishes his own control over

the stimuli. As Mackworth (1977) describes it:

> This skilled performer is relying on the context to let him predict the upcoming meaning and grammatical constructions that will shortly be fixated directly. The essence of the game is to create a temporary stabilization of the fast-changing verbal situation. . . . the ability to plan the processing of information by picking the most appropriate subroutines to deal with fast-changing requirements. (p. 19)

In order to account for the fact that poor readers can do well on stimulus-bound tasks, and yet do rather poorly on self-ruled reading tasks, Mackworth (1977) suggests that the problem might be attributed to the late development of the frontal lobes in the brain. Drawing on the works of Luria (1966), Milner (1971) and Pribram (1971), Mackworth (1977) points out that since the frontal lobes of the brain are responsible for the discovery of rules, self-critical activities, and the segmenting of a series of events, the development of the frontal lobe structures must be critical for purposive and proficient reading. Indeed, Milner (1971) has experimentally shown that the recognition of single words is the unique function of temporal lobes, whereas the perception of the sequencing of a series of words is mainly a function of the frontal lobes. As Mackworth (1977) describes it, the frontal lobes in reading:

> create general intentions and plans to regulate and control subsequent actions by self-criticism and evaluation. But Luria (1966) and Pribram (1971) stress that the frontal lobes organize behavior in an even more direct manner during serial tasks. They have ongoing supervisory or executive functions which maintain a running analysis of actions and thoughts to keep the main intention uppermost. (p. 20)

Up to this point, it seems that Mackworth (1977) presents a significant addition to an understanding of how attentional processes work as "top-down" intentional behaviors in the reading process.

However, he then goes on to suggest that in poor readers "the short-term memory cannot provide the proper context or subroutines to use in the searching of long-term memory" (p. 21). By this, Mackworth (1977) makes the implication that the short-term memory capacity limitations of the poor and younger reader cause the difficulty. On the basis of the previous discussion concerning capacity models, however, it is argued that a more plausible explanation would be that the poor reader fails to impose his own self-regulation of the reading task, thereby making it an activity which is more "stimulus-bound" than "self-ruled." In other words, the poor reader fails to set his own purposes for reading, and most likely views the major reading task as essentially a decoding activity. A further argument against Mackworth's (1977) hypothesis of short-term memory capacity limitations in poor readers is that the problem is most often only manifested in the reading situation and does not generalize to other subject areas or learning tasks. In any case, it would appear that the counterargument of the poor reader's failure to impose his own self-regulation can be fairly straight-forwardly examined by having the poor reader attend to self-regulatory or planning strategies on a reading task and observe performance differences when no self-regulation is encouraged.

In an attempt to clarify the interrelationships between regulation or metacognition and cognition in the reading process, Forrest and Waller (1980) suggest that:

> Cognition refers to the actual processes and strategies that are used by a reader. On the other hand, meta-cognition is a construct which refers first to what a person knows about his/her cognitions (in the sense of being consciously aware of the processes and of being able to tell you about them

> in some way), and second, to the ability to control these cognitions (in the sense of planning cognitive activities, choosing among alternative activities, monitoring the performance of activities, and changing activities). (p. 2)

This view appears to be consistent with the notion of top-down attentional processing as it has been developed here.

Although this review of the literature regarding reading as an intentional behavior has been quite brief, it is obvious that by incorporating both a "top-down" and "bottom-up" view of attentional processes in reading, the present notions concerning "the optimization of attention" (Gibson and Levin, 1975) in the reading field need some refinement. Before presentation of a redefinition of optimization of attention in reading and the implications for the reading disabled, two points by way of summary of this segment are necessary.

1. Researchers in the area of reading have begun to explore attention as a "top-down" process and there appears to be considerable agreement to the notion that optimal attention involves intention, planning, and self-regulation. This position is very similar to the "interactive" or "cognitive" approach that is similarly beginning to appear in the general literature on attention.

2. So far, the investigations concerning attention as a "top-down" process in reading have been based on "bottom-up" investigations (Hochberg, 1978; Mackworth, 1977).

In concluding this segment, it is suggested that there is a conspicuous need for an investigation of "top-down" attentional processing using a "top-down" investigative approach. This is the primary purpose of the present study.

A Redefinition of the Optimization of Attention in Reading

In review of the above discussion of attention in reading, the earlier quote by Mostofsky (1970):

> attention, implying as it does multivariate considerations of process (attentional), subject (attentive) and stimulus (attention-getting), will require multi-dimensional analytics (p. 22)

takes on new significance. The picture of the proficient reader who (as we now see it) is utilizing optimal attention, is one who can flexibily apply her/his attention to the visual information on the page; to the interpretation of the author's meaning; to her/his own reflective or background knowledge; or to an overriding macro-goal that can be self-regulated or other imposed. Where the attention gets allocated is both self and situationally determined. The decision for attentional allocation is dictated by the reader's self-defined, self-regulated, or interpretive view of the task purpose. Different attentional allocation strategies are more efficient for different tasks, and the proficient reader will rely on those most expedient to her/his goal.

There were no studies that could be found in the literature which specifically dealt with a model of attention incorporating both "bottom-up" and "top-down" processing. As previously mentioned, even the reading researchers who advocate this view of attention and the reading process (Hochberg, 1976, 1978; Mackworth, 1977) appear to rely on bottom-up type investigations (i.e., text manipulations, tachistoscope studies). However, there is some significant work in the area of metacognition that has been recently flooding the developmental literature (Flavell, 1978; Brown, 1978) that would appear to

be a logical starting point for an analysis of attention in the reading process from a "top-down" perspective. Though there appear to be any number of metas (i.e., metamemory, metacomprehension, metalearning) that fall under the rubric of "metacognition," the collective term, as defined by Flavell (1976):

> refers to one's knowledge concerning one's own cognitive processes and products or anything related to them, e.g., the learning-relevant properties of information or data. . . . Metacognition refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive objects or data on which they bear, usually in the service of some concrete goal or objective. (p. 232)

It is of considerable interest to note that the above description of "metacognition" captures many of the features that researchers in the area of attention (i.e., Douglas and Peters, 1979; Gibson and Rader, 1979) and in the area of reading and attention (i.e., Hochberg, 1978; Mackworth, 1977) have recently begun to explore. In fact, we are beginning to see an increasing number of investigations in the literature dealing with the metacognitive or metacomprehension aspects of reading (DiVesta, Hayward, Orlando, 1979; Myers and Paris, 1978; Forrest and Waller, 1979; Brown, Campione and Barclay, 1979). Myers and Paris (1978), for example, conducted an interview study with eight and twelve year old children in an effort to determine metacognitive awareness of personal abilities, task parameters, and cognitive strategies. On the basis of the findings that the younger children were less sensitive to the semantic structure of paragraphs, goals of reading, and strategies for resolving comprehension failures, the authors concluded that metacognitive knowledge indeed appears to be a major factor in the acquisition of proficient reading skills.

Of even greater significance to the present discussion are the ever increasing number of studies which suggest that both other-regulated and self-regulated "top-down" strategies have a significant effect on the learning and performance. Lichtenstein and Brewer (1980) were able to demonstrate that a plan schema of underlying events was the most important factor in both behavioral and narrative prose recall. Similarly, Ross, Rakow and Bush (1980) have shown that helping the student to improve his strategies for self-managed learning systems results in significantly better retention and learning efficiency, over both traditional instructional aid to the student (i.e., the teacher giving the response as opposed to the student solving the problem), as well as incentive effects. Utilizing a somewhat unusual approach, Denney (1975) and Denney, Jones and Krigel (1979) have utilized a number of cognitive strategy modeling and training techniques, that have been successfully adopted and applied by children and elderly adults to improve their performance on a 20 Questions task.

The above studies suggest a number of ways in which a "top-down" approach might be operationalized, as well as the kinds of concerns that can be effectively examined in this way. With respect to the role of attention and its significance as a "top-down" process, there are a number of areas that need to be explored. For example, we need to know how the hierarchy of self-rule (self-regulation) is sequenced (i.e., metacognitive level, to metacomprehension, etc.); if the upper level processes are available to the child; if they are available, does the child use them; and in which particular reading

situations; how can we train the child to give attention to higher level cognitive strategies during the reading task, and what are the instructional conditions that facilitate this? There are already some good examples in the reading literature of how one could begin to investigate these kinds of problems (Dee-Lucas and DiVesta, 1980; Brown, Campione, Joseph, Barclay, 1979; DiVesta, Hayward, Orlando, 1979; Forrest and Waller, 1979, 1980). Forrest and Waller (1980), for example, examined the ability of young children to make appropriate verbalizations about the decoding, comprehension and strategic aspects of reading, and used stepwise multiple regressions to predict reading ability. They found that:

> at the grade 3 level, the multiple regression equation accounted for 46.82% of the variance with decoding being the best predictor from the set of reading skills. At the grade 6 level, the multiple regression equation accounted for 62.73% of the variance with strategies being the best predictor from the set. (p. 7)

Techniques such as those used above are still at a pioneering level in this kind of research, but the findings do appear to provide substantial support for continued investigations of this sort.

In another study, Owings, Petersen, Bransford, Morris and Stein (1980) gave the least and most successful boys from a regular grade five class study stories to read which varied in the degree to which they made sense relative to participants' prior knowledge. The difference is exemplified by the sensibility of the two following sentences: "The tall boy played basketball" versus "The hungry boy took a nap." Their findings are of interest on several accounts. The Owings, Petersen, Bransford, Morris and Stein (1980) compendium of the results is as follows:

> For both groups, cued recall test scores (e.g., "What did the hungry boy do?") were substantially higher for stories that made sense than for stories that did not. Successful students spontaneously monitored as they read and studied; they were aware of having difficulty learning the less sensible stories, and they could explain why they were having trouble. Less successful students did not rate difficulty accurately and seemed unaware of the manipulation. When allowed unlimited study time, successful students spontaneously regulated learning, that is, they chose to study difficult stories more than easy stories. Less successful students studied equally for both. When prompted, less successful students were able to distinguish between stories, but they did not do so spontaneously. The results suggest that many students perform below their potential, in part because they do not spontaneously monitor and regulate their learning. (p. 250)

The above study also exemplifies the utility of observing samples of more and less proficiency in this "top-down" approach. Before giving a summary of the investigation that is proposed for this study, a brief discussion of the implications of an investigation of attention using a "top-down" approach for reading disabled students is in order.

We know that a major proportion of learning disabled students have difficulty in the reading and reading related subject areas in school. One of the major factors that is hypothesized as the cause of this difficulty is attention deficit. However, despite a considerable amount of investigative effort that has been undertaken to identify the nature and extent of the interrelationship and, indeed, how to remediate the problem, there is considerable controversy and contradiction even on what appear to be rather major issues. For example, it is unclear whether the learning disabled have a general disposition for attention deficit (Dykman et al., 1971); or whether this is true only for a distinct subgroup of learning disability

(Douglas and Peters, 1979) or whether it is a specific aspect of attention that creates the predominant impediment to the learning disabled child's learning (Ross, 1976).

In view of some of the problems discussed above in the area of attention and learning disability, the "top-down" approach to attention in reading offers a number of advantages. To begin with, it provides a necessary completion to an investigative framework that is decidedly "bottom-up" oriented, both from the reading and learning disability perspective. Since the learning disabled student is of comparable intelligence with respect to his normal peers, it is possible that many of the metacognitive routines are already developed and utilized in learning tasks other than reading. If so, one could expect that for the older learning disabled student who has outgrown or overcome any possible perceptual problems, promoting him to rely on or attend to such metacognitive abilities during a reading task should markedly affect his performance. The ecological validity of the task is established by the fact that it is the actual reading task that is used in the investigation. The specific task variables versus child characteristics can be clearly examined (Krupski, 1980). Many of the experimental methods that are used to improve subject performance can be easily adapted for classroom or remedial use. In a similar vein researchers can capitalize on a wide repertoire of strategies that experienced teachers have been using for years as material for laboratory training programs.

In view of the discussion thus far, the following study is proposed. The effects of instructional conditions, differing according

to the degree of other-directedness for promotion of attentional self-ruling, on a reading task will be examined. The specific conditions to be used include incidental attention (no other direction), intentional attention (slight other direction), planned intentional attention (substantial other direction), and trained intentional attention (maximal other direction). Performance will be evaluated on the basis of story recall and comprehension measures. Regular grade five students and reading disabled students who are assessed as reading at the grade five level will be involved in all four learning conditions. The higher grade level was chosen because it was anticipated that there would be greater evidence of top-down attentional strategy usage at the higher grade levels (Forrest and Waller, 1980), and also we could expect that the learning disabled readers would have, at this level, overcome any of the perceptual difficulties that are often associated with this group.

CHAPTER 3

RATIONALE, DEFINITIONS, HYPOTHESES

Rationale

Various theoretical and experimental approaches have been used to determine why the major proportion of those identified as learning disabled are unable to learn to read or read at the level of their IQ and chronological age matched peers. One widely accepted explanation of the learning difficulties of this group is the notion of attention deficit. Traditional "filter" and "capacity" theories of attention have been adopted to test this notion and the experimental results emanating from the typical "matching familiar figures" or "incidental learning" paradigms have been acknowledged as supportive of an attention deficit hypothesis in the learning disabled. However, there appears to be a growing dissatisfaction with this traditional viewpoint, and the notion is currently being attacked on several fronts (Douglas and Peters, 1979; Pelham, 1979).

From an educational perspective, the criticisms are centered around the definitional, structural versus control, and ecological validity issues. These conceptual issues were discussed in some detail in the introduction of this study. The subsequent review of the literature not only confirmed the validity of these concerns for learning disability research, but were found to be applicable to the reading and attention investigative areas as well.

By far the most crucial issue appears to be related to

definitional concerns. The experimental literature reveals several attention definitions, and at least as many ways of testing the construct. Similarly, there are seemingly countless ways to define reading and consequently countless ways to examine reading performance. When there are attempts to combine say, the notion of attention and reading, or reading and learning disability, the problem is only compounded. Needless to say, this situation most certainly is a primary factor with regard to the apparent disorganization and fragmentary character of the research literature.

Both structural versus control and ecological validity issues are assuming increased prominence in the attention and reading research. For example, traditional theories of attention are being attacked as being biased toward a structural orientation (Douglas and Peters, 1979), or for a failure to adequately account for qualitative changes in the young child's development of attention (Gibson and Rader, 1979). In the area of reading, researchers have long been dissatisfied with experimental approaches which, in the interest of experimental control, break reading down to a number of subskills such as word identification, or letter discrimination; tasks which many investigators argue are too far removed from the actual reading situation to be ecologically valid for classroom application. Such concerns no doubt have spurred the recent flood of investigations concerning story comprehension, study skills and metacomprehension.

Despite what seem to be crucial conceptual obstacles, there appears to be sufficient evidence in the research literature to warrant an integrative investigation of reading, attention and reading

disability. As a result of the many shortcomings of traditional attention models, theorists and researchers are beginning to advocate an alternative model of attention which features both perceptual and cognitive aspects of attention. Although there is no general "cognitive" or "interactive" theory of attention at present, there are certain characteristics which set this approach apart from traditional attention theories. The most important characteristics are that cognition guides attention (Neisser, 1967); that attention organizes perceptual intake (Hochberg, 1978); that attention is intrinsically tied to the planning (Hochberg, 1979), purposive (Gibson and Rader, 1979), executive (Mackworth, 1977) or metacognitive (Douglas and Peters, 1979) abilities; that attention undergoes qualitative changes across development (Gibson and Rader, 1979) and that optimal attention is achieved through increasing self-regulation (Douglas and Peters, 1979; Mackworth, 1977). Of considerable interest is the fact that this "interactive" or "cognitive" view of attention is being advocated by general attention theorists (Gibson and Rader, 1979; Neisser, 1967), by reading researchers (Hochberg, 1978; Mackworth, 1977) and special education researchers (Krupski, 1980).

With respect to the reading process, it was suggested that attentional processing could be viewed (in light of the "interactive" or "cognitive" view of attention) as both a "bottom-up" and "top-down" process. The former emphasizes the investigation of various reading subskills such as attention in letter discrimination, or word identification, whereas the latter approach emphasizes the reader's attentional planning and self-regulation abilities that are utilized in their day-to-day, functional or recreational reading.

Recent research and discussion in the area of reading suggests that the proficient reader is one who can flexibly apply his/her attention to the visual information on the page; to the interpretation of the author's meaning; to his/her own reflective background knowledge, or to an overriding macro-goal that can be self-regulated or other imposed. Where the attention gets allocated is self and situationally determined. The decision for attentional allocation is dictated by the reader's self-defined or interpretive view of the task purpose. It also seems likely that different attentional allocation strategies are more efficient for different tasks, and the proficient reader would selectively rely on those most expedient to his/her goal.

Although we know a great deal about the relationship between reading and attention from a bottom-up perspective, the literature is essentially void with respect to a top-down approach to reading and attention. However, recent studies in the area of metacognition and metacomprehension suggest that a reader's attention to such potential attentional organizers as metacomprehension strategies are important in the development of proficient reading. For example, Forrest and Waller (1980), using multiple regression equations, found that metacomprehension strategies were the best predictors to account for the variance of decoding, comprehension and strategy usage scores at the grade six level, whereas decoding was the best predictor for the grade threes in the sample.

It is most unfortunate that the research in the area of attention and reading has been so decidedly one-sided toward a view of attention as a unidirectional bottom-up process. For it is quite

conceivable that it is the attention to these top-down strategies or metacomprehension plans during the reading process that distinguishes children from adult readers, poor from proficient readers, or normal from disabled readers. It is this possibility that is to be explored and examined in this research.

By examining normal and disabled readers on a silent reading task under different instructional conditions (which vary according to the amount of other-direction for the promotion of attentional self-regulation), several questions can be answered. First, it might be determined whether attentional self-regulation in reading is apparent in normal reading development. Next, by comparing performance across experimental conditions, information can be derived with respect to improvement in performance resulting from attentional self-regulation. This approach may also provide data which are relevant for classroom utilization, in that the instructional approach yielding maximal performance for each group may be ascertained. If significant discrepancies in "top-down" attentional self-regulation between normal and reading disabled can be eliminated through instructional conditions, the results would be of interest to those with theoretical, experimental, and/or remedial concerns in the areas of attention, reading, and learning disability.

Some mention should be made concerning the dependent variables selected for this study. In using recall and comprehension scores, the obvious confonding of attention, memory and comprehension is acknowledged. The immediate question is how do we know if it actually attention that is under study here? To help to clarify the interrelationship, Vygotsky's (1978) view of the relationship between memory and

attention has been adopted in the present study.

> The possibility of combining elements of the past and present visual fields (for instance, tool and goal) in one field of attention leads in turn to a basic reconstruction of another vital function, memory. (p. 36)

In other words, Vygotsky (1978) suggests that both attention and memory are vital to the learning process in that attention is that mechanism which allows one to examine the contents of the past in view of the present. Within the context of a silent reading task, the attention of the reader can be momentarily and/or substantially allocated to the visual stimuli, the interpretation of the text, the reconstruction of the text on the basis of the reader's prior knowledge, and/or to an overriding metacognitive or metacomprehension plan of the reading task. By systematically examining recall performance over conditions which vary in the degree to which they direct the reader to attend to a metacognitive plan of the reading task, the effects of attentional self-regulation as a top-down process in normal and disabled readers can be inferred.

A final variable, passage reading time, should provide an additional indication as to whether meta-strategies are being adopted in the intentional instructional conditions. For example, if a subject reviews selected story parts before indicating his readiness to recall, this would require more reading time.

Definitions

Incidental Condition

Subjects are only instructed to silently read the experimental passage.

Intentional Condition

Subjects are instructed to silently read the experimental passage and are informed of the recall requirement at task completion.

Planned Intentional

Subjects are provided the same instruction as the intentional group as well as nine pre-task interview questions (Appendix C) to induce the subject to adopt any self-generated meta-strategies to improve task recall and comprehension.

Trained Intentional

Subjects initially undergo four forty-five minute training sessions in which a specific metacognitive reading strategy (SQ3R, Appendix D) is taught, and practice is provided in self-regulating attention to the overall strategy during the silent reading of short passages. Prior to their reading of the experimental passage, subjects are provided the same instruction as the intentional group and then specifically told to use the SQ3R approach.

Recall

This refers to the subject's unaided retelling of the story immediately following the silent reading experimental task.

Comprehension

This refers to the subject's cued recall and understanding of story information that is specifically requested in the form of comprehension questions (Appendix A). It should be noted that the majority of questions are at a literal level (8/10), with only the last two questions at the inferential level. As such, it is acknowledged that comprehension as it is defined here, is somewhat narrow in scope.

Idea Units

The story to be used as the experimental task in this study has been broken down into 59 idea units for use in a previous study

(Brown and Smiley, 1977). An idea unit was defined as "one which contained an idea and/or represented a pausal unit, that is, a place where a reader might pause" (p. 3). The technique was originally proposed by Johnson (1970) as "an objective method for dividing complex verbal material into linguistic subunits (pausal units)" (p. 2). The idea units for the experimental task story "The Dragon's Tears" are found in Appendix B.

Level-of-Importance Idea Units

The idea units of the story to be used in this study have also been rated by college students into four levels of importance to the theme (Appendix B). This information is to be used in the analysis of the data from the present study as an indication of the quality of information that the individual subject attended to while reading the story and subsequently recalled.

Average Reader

Any student in a regular grade five class who has had normal year-to-year grade progression; who has average non-verbal intelligence in the range of 90-115 (according to the school administered Lorge-Thorndike IQ Test); who scores in the range of grade 4.5 to 5.6 on the reading comprehension subtest of the Canadian Test of Basic Skills (CTBS); who scores at or above a grade five equivalent level on a word identification test (Schonell, 1942); and who has no history of any physical, emotional, or neurological anomalies. The latter was assessed by perusal of student records and teacher and counsellor consultation.

Disabled Reader

There was no definition in the literature which was assessed to be completely adequate for the purposes of this study. Therefore, the following definition offered by Eisenberg (1966) though one of the better of those available, needs certain qualifications. These will be discussed following the definition.

> Specific reading disability may be defined as the failure to learn to read with normal proficiency despite conventional instruction, a culturally adequate home, proper motivation, intact senses, normal intelligence, and freedom from gross neurological defect. (p. 360)

The two major criticisms of the above definition are (1) that terms like "culturally adequate home" and "proper motivation" are difficult to define and virtually impossible to assess and (2) that data from a variety of professional sources is required (i.e., medical, educational, and social) to verify the identification of reading disability subjects. To adapt the definition to suit the purposes of the present study, the terms "culturally adequate home" and "proper motivation" are to be eliminated, and the remaining criteria will be respecified according to the descriptions outlined above for the average reader. Thus, the following revised definition is to be used for the selection of reading disabled subjects in this study.

Disabled reader refers to those students who have failed to learn to read with normal proficiency. This includes any student in a regular grade seven class who has an average non-verbal intelligence score in the range of 90-115 (according to the school administered Lorge-Thorndike IQ Test); who scores in the range of grade 4.5 to 5.6 on the reading comprehension subtest of the CTBS; who scores at a

grade five level or above on a word identification test (Schonell, 1942); and who has no history of any physical, emotional or neurological anomalies. The latter will be assessed by perusal of student records and teacher and counsellor consultation.

Since the reading acquisition of the reading disabled is reportedly dominated during the initial years by any number of perceptual or developmental factors, the present study attempts to control for this problem by setting a relatively high reading acquisition level (i.e., grade five) for the learning disability samples. In doing so, the above definition is tailored to include the assumption that the basic word identification skills are adequately developed for these samples. This can be verified by comparing the word identification scores for sample groups. In addition, since metacognitive strategies in reading are more predominant at higher grade levels (Forrest and Waller, 1980), it would seem that reading disabled students in the seventh grade level, reading at the fifth grade level, would be the prime candidates for examining failure to attend to metacognitive plans during reading.

Hypotheses

Recall Performance

Hypothesis 1

Over all experimental conditions, mean recall performance for both groups (average and reading disabled) will be positively related to level of importance of idea unit (i.e., level 1 < level 2 < level 3 < level 4).

Hypothesis 1-1

Mean recall of high idea units versus low level units will increase across experimental conditions for reading disabled subjects.

Hypothesis 1-2

Mean recall will be greater for average subjects as compared to reading disabled subjects only in the incidental experimental condition and not in the other three intentional conditions.

Hypothesis 1-3

Mean recall performance for reading disabled will increase across learning conditions (i.e., incidental < intentional < planned intentional < trained intentional).

Comprehension Performance

Hypothesis 2

Average readers will obtain a greater number of correct responses to comprehension questions than reading disabled in the incidental learning conditions and not in the other three intentional learning conditions.

Hypothesis 2-1

Correct responses to comprehension questions will increase across learning conditions for reading disabled subjects (i.e., incidental < intentional < planned intentional < trained intentional).

Passage Reading Time

Hypothesis 3

Passage reading time will increase for both groups (i.e., average and disabled readers) across learning conditions (i.e., incidental < intentional < planned intentional < trained intentional).

Hypothesis 3-1

Passage reading time will be longer for disabled readers than average readers in all conditions.

Chapter 4

METHOD

Subjects

The rationale for selection of the experimental groups has been outlined previously (pp. 43-44; 48-49). Average and disabled readers were examined in this study. The grade five (average readers) and grade seven (disabled readers) students were selected from elementary and junior high schools in the Edmonton Separate School System. The sample of students was considered adequately representative of the total school population with respect to socio-economic status, and there were no predominant second language or cultural groupings in the area. Groups were selected and equated on the basis of IQ scores and reading achievement scores. For this purpose, the tests used by the school system were utilized. The Lorge-Thorndike Intelligence Test, non-verbal IQ score was used for selection of students in the average range of intelligence (90-115). The successful use of this test for screening learning disabled children has been reported in the literature (Baker and Kauffman, 1978). Since the verbal component of the Lorge-Thorndike Intelligence Test is highly dependent on reading proficiency, neither Verbal or Full scale quotients were considered appropriate for selection use. Reading achievement is annually assessed in the school system by means of the Canadian Test of Basic Skills (CTBS). Groups were matched for performance on the reading comprehension subtest (grade equivalent range 4.5-5.6) of the most recently administered CTBS. The reported test reliability is based on

he split-half technique and is reported for each subtest at each grade level. At the grade five level, the split-half reliability coefficient is .93 for the reading comprehension subtest. No attempt was made to control for sex ratio in the selection of samples. The sample characteristics of the groups are indicated in Table 1.

Teachers and principals were consulted in order to exclude subjects with any serious sensory, emotional and organic anomalies. In addition, any subject unable to achieve a grade equivalent of at least 5.0 on the Schonell Graded Word Reading Test (1942) was eliminated from the study. Letters were sent to the parents or legal guardians of all students who were screened as acceptable for inclusion in the study to notify them of the purpose of the research.

Subjects were randomly assigned to one of four experimental conditions (i.e., incidental, intentional, planned intentional, trained intentional) and each experimental group included 15 average readers and 15 disabled readers.

Stimulus Materials

It was the intention of this study to ensure that the experimental task approximated the normal silent reading situation as closely as possible in order to satisfy ecological validity concerns as well as the external validity of the findings. The Japanese folk tale, "The Dragon's Tears," used in several previous studies (Brown and Smiley, 1977; Brown, Smiley and Lawton, 1977; Smiley, Oakley, Worthin, Campione and Brown, 1977) was selected for this study. There are several reasons why the story is considered appropriate here. First, the story has been widely and successfully utilized with subjects at

Table 1

Sample Characteristics

Sample	Chronological Age	Lorge-Thorndike Nonverbal IQ	CTBS Reading Comprehension	Schonell Word Identification
60 average readers	$\bar{x}$ = 11.5	$\bar{x}$ = 103.8	$\bar{x}$ = 5.04	$\bar{x}$ = 6.09
35 female 25 male	(SD = .655)	(SD = 6.9)	(SD = .36)	(SD = .573)
60 disabled readers	$\bar{x}$ = 13.6	$\bar{x}$ = 100.5	$\bar{x}$ = 5.36	$\bar{x}$ = 5.94
29 female 31 male	(SD = .723)	(SD = 7.5)	(SD = .31)	(SD = .494)

this grade level as well as with both good and poor readers. As mentioned previously, the story is broken down into 59 idea units which have been rated and tested for importance to the theme of the story. Therefore, recall protocols obtained from this research can be scored both for total number of idea units, as well as the importance level of the idea unit to the gist of the story. "The Dragon's Tears" is 390 words in length and has a reported Dale-Chall (1948) readability score of 5.2287, which makes it suitable reading material for subjects reading at a grade five level. In addition, the story content is both interesting and of a form which is highly familiar to students of this level.

The story was typed on white paper and then glued to a yellow cardboard backing and plasticized to ensure the durability of the stimulus materials throughout the duration of the experiment.

Pilot Study

A small scale pilot study was conducted at the Lamont Elementary and Junior High Schools in order to: assess the suitability of the experimental story; to determine the appropriateness of the 10 comprehension questions; to determine the adequacy of questions selected for the pre-task interview questions for the planned intentional learning condition; and to check for general procedural complications.

At each grade level, six students were assigned to one of three (i.e., incidental, intentional, planned intentional) learning conditions (see definitions, pp. 50-51). Instructions appropriate to the learning condition were read to the individually tested subjects

and they were then given the story to read silently. Passage reading time was recorded. Subjects were then asked to recall the story and then answer the 10 comprehension questions. All verbal responses were tape recorded.

The level of recall was determined by the number of idea units recalled, which were also categorized according to level of importance. Comprehension was assessed in terms of number of correct responses out of 10. Although the results were not subjected to statistical analysis, a general hierarchical arrangement of idea units was indicated (e.g., Level 1 < Level 2 < Level 3 < Level 4), though no group or condition effects were readily discernible.

On the basis of the pilot study results, the recall questions (Appendix A) and the story of "The Dragon's Tears" (Appendix B) were assessed as adequate for the experiment. However, with regard to the pre-task interview questions for the planned intentional group, the third question "How would you find the name of a place in a story?" was found to be confusing for the majority of the pilot study subjects and was therefore eliminated from the experimental pre-task interview questions for the planned intentional group.

A procedural consideration of equating the time from entering the experimental room, listening to the appropriate pre-task instructions, to the actual reading of the passage was also noted.

Instructions

As mentioned previously, subjects were randomly assigned to one of four experimental conditions. The instructions given in each condition were as follows:

Incidental: "I would like you to read this story. Let me know when you have finished reading."

Intentional: "I would like you to read this story and then tell me as much as you can remember of it. Let me know when you are ready to recall the story."

Planned Intentional: Subjects were pre-interviewed using five of the Forrest and Waller (1980) questions as well as four experimenter devised questions (Appendix C) to encourage the subject to think about and adopt a self-selected metacognitive plan to utilize on the experimental task. The subjects were specifically asked to verbalize the self-selected plan before starting the experimental task. At this point, the instructions given were: "I would now like you to read this story and then tell me as much as you can remember of it. Let me know when you are ready to recall the story."

Trained Intentional: Subjects in this experimental condition were initially subjected to four, forty-five minute group sessions, in which they were taught how to use a specific metacognitive strategy, an adapted version of the SQ3R approach (Sargent, Huus and Andresen, 1970) on a silent reading task. The approach is briefly summarized in Appendix D and is described in the next section. Prior to experimental task performance, the following instructions were given: "I would like you to read this story and then tell me as much as you can

remember of it. Use the SQ3R approach for this. Let me know when you are ready to recall the story."

Training Sessions

After the samples had been randomly assigned to their respective learning conditions groups, arrangements were made with the schools for the scheduling of the training sessions for the trained intentional group subjects. Over a one month period all subjects in this condition received four, 45 minute small group training sessions. The average group size was five and in the cases where the school comprised both grade five and grade seven classes (five out of eight schools), average and disabled readers were paired for simultaneous training sessions. All training sessions were conducted by a trained female research assistant.

The typical training session began with a five minute review, recitation and discussion of the steps in the SQ3R approach (Appendix D). Subjects were encouraged to openly discuss the strategies utilized in the previous session, and to indicate strategic plans or aspects that they were focusing on for the current session. At this point, the research assistant would summarize the discussion and review the importance of certain aspects of a story such as main idea, time line of events, main characters, who, what, when, where and why.

Following this a mimeographed copy of the day's story would be distributed to each student. The four stories used for the training sessions can be found in Appendix E. It should be noted that the stories are all part of the experimental stimulus battery

used by Brown and her associates at the Illinois Centre for the Study of Reading. All of the stories have been assessed for equivalence in terms of readability, motivating interest, length, content and number of idea units and in all aspects are considered to be similar to the experimental story. Students were led through each of the SQ3R steps in each session and throughout, encouragement for self-monitoring of each step was given.

After the students had written out their story recalls, they were directed to self-evaluate their efforts, review the story for important information that was omitted, and to discuss with the group how they might improve their performance during the following session.

Before the end of each session, a few minutes were reserved for a review of the major steps and the important aspects of a story were again summarized.

In general, the students appeared to enjoy the small group sessions, and some reported their self-initiated utilization of the approach in their other school-related reading as well as their recreational reading. No problems were encountered with respect to combining sessions with grade five and grade seven students.

Procedure

The experiment was carried out in the respective schools of the students. All subjects were individually tested in a room designated by the school principal. Subjects were seated at a table facing the experimenter, and were informed of their selection for the research project and reminded of the letter that was sent home to

their parents or guardian. A word identification test was administered (Schonell, 1942) and if a grade equivalent of at least 5.0 was obtained the experimental session continued.

The interim from completion of the word identification test to the actual silent reading of the passage was somewhat longer for the planned intentional group subjects since they had several pre-task interview questions to initially respond to (approximately five minutes). Therefore an attempt was made to provide a similar interim time block prior to the reading of instructions for the subjects in the remaining three conditions by engagihg students in casual conversation. After the experimenter read the appropriate condition instructions the two story cards were given to the subject to silently read.

Certain behavioral checks were noted during the student's reading. For example, all subjects were timed from when the story cards were handed to them, to when they indicated to the experimenter that they had finished reading the story and that they were ready to recall it. In addition, any behavioral evidence of metacognitive strategy usage (i.e., skimming through the story, looking away and attempting to recite events of the story, checking back through the story passage) while performing the experimental task was noted on the subject's protocol sheet (see Appendix H). These observations are briefly and anecdotally summarized in the results section.

After the subject indicated that s/he had finished reading the story and was ready for recall, a tape recorder was switched on

to record the story recall. Prior to leaving the experimental room, all subjects were asked not to retell the story to their friends and classmates and not to let anyone know that a memory task was part of the experiment. The total testing time for each individual subject was approximately 15-20 minutes.

Scoring

1. Recall: The recall protocols for each subject were transcribed and subsequently rated by the experimenter. The idea units of the individual subjects were assessed on the basis of the Brown and Smiley (1977) ratings and the appropriate importance level rating was assigned. The number of idea units within each importance level and the grand total was computed.

The reliability of the scoring was assessed using an inter-rater reliability procedure. Four markers, the investigator, two students and a sessional lecturer at the University of Alberta, independently scored one randomly selected protocol from each experimental condition at each grade level. Thus, the same random sample of eight subject recall protocols was scored by each marker. Markers were instructed to score a particular idea unit as recalled if the central message of each idea unit was maintained irrespective of the exact wording. The Arrington Formula was utilized and coefficients of agreement were calculated from a total of 161 scored idea units:

$$\frac{2 \times \text{agreements}}{2 \times \text{agreements} + \text{disagreements}}$$

(Feifel and Lorge, 1950).

Table 2

Percentage of Agreement of Judges 1, 2, 3 and 4

Judges	Agreement
1,2	91%
1,3	93%
1,4	92%
2,3	91%
2,4	91%
3,4	93%

The assessment of the results in Table 2 would suggest that there was reasonable agreement with respect to determination of idea units with subject recall protocols, as well as the evaluation of comparative importance level based on the Brown and Smiley (1977) ratings.

2. Comprehension: A score of one was given for each correct response. The total possible correct responses for the comprehension questions was 10 (see Appendix A for a listing of the 10 questions).

CHAPTER 5

RESULTS AND DISCUSSION

Prior to the main analyses, a number of sample difference checks were carried out. Subjects were selected for inclusion in the experiment if the previous year's reading comprehension score on the CTBS fell within a range of grade 4.5 to grade 5.6 and if their most recent non-verbal quotient on the Lorge-Thorndike fell within the range of 90 to 115. Preliminary checks for both criteria were run to ensure that there were no significant differences between average and disabled readers. The results confirmed that there were no differences. As mentioned previously, all subjects were subjected to a word identification test (Schonell, 1952) in the initial stage of the experimental session, and were required to achieve a grade equivalent of 5.0 in order to remain in the experimental sample. Since there was, however, no upper limit set, the grade-equivalent scores of the average and disabled reader samples were compared. The grade equivalent means were 6.09 and 5.94 for average and disabled readers respectively, and no significant differences were found. It was therefore assumed that the groups were equivalent with respect to word identification proficiency.

Previous studies with learning disabled and reading disabled samples have often found an interaction of sex differences and experimental variables. Since there was no attempt to control or equate sex in the experimental conditions, an initial analysis to

check for possible sex difference effects was carried out. Main effects due to sex were examined utilizing a 2 (groups) x 4 (conditions) analysis of variance (ANOVA) with mean recall and mean comprehension as dependent variables. The results (Appendix F) indicate that there were no significant differences due to sex for average nor disabled readers on recall or comprehension. Therefore, subsequent analyses were carried out on groups collapsed over sex.

Recall: Results

Total recall was calculated for each subject on the basis of "n" idea units out of a possible 59. These recall data were also categorized into "n" idea units at each level of importance. Recall performance differences were examined utilizing a 2 (groups) x 4 (learning conditions) x 4 (idea unit levels) analysis of variance with the mean percentage idea units recalled at each level as dependent variables. Table 3 presents the results of this analysis.

A significant main effect for learning conditions ($F = 4.68$, $df = 3/112$, $p \leq .004$) was obtained as well as a significant interaction of groups x learning conditions ($F = 2.72$, $df = 3/112$, $p \leq .04$). These results are graphically depicted in Figure 1. Newman-Keuls tests (Winer, 1971) (Table 4) on the means of the interaction indicate that whereas there is no appreciable difference in recall for average readers across learning conditions, the reading disabled show an interesting pattern of improvement across condition. From incidental to trained intentional ($Q = 6.14$, $df = 112$, $p \leq .01$), from planned intentional to trained intentional ($Q = 3.58$, $df = 112$, $p \leq .05$),

Table 3

ANOVA for Recall Data
2 (Groups) x 4 (Learning Conditions) x 4 (Idea Unit Levels)

Source	df	MS	F	p
Between				
Reading Groups	1	2.00	.005	NS
Learning Conditions	3	1848.6	4.675	≤.004
Groups x Conditions	3	1075.9	2.72	≤.047
Error	112	395.3		
Within				
Idea Unit Levels	3	47843.74	466.6	≤.000
Levels x Groups	3	84.71	.826	NS
Levels x Conditions	9	27.62	.269	NS
Levels x Groups x Conditions	9	154.62	1.5	NS
Error	336	102.53		

n = 15.

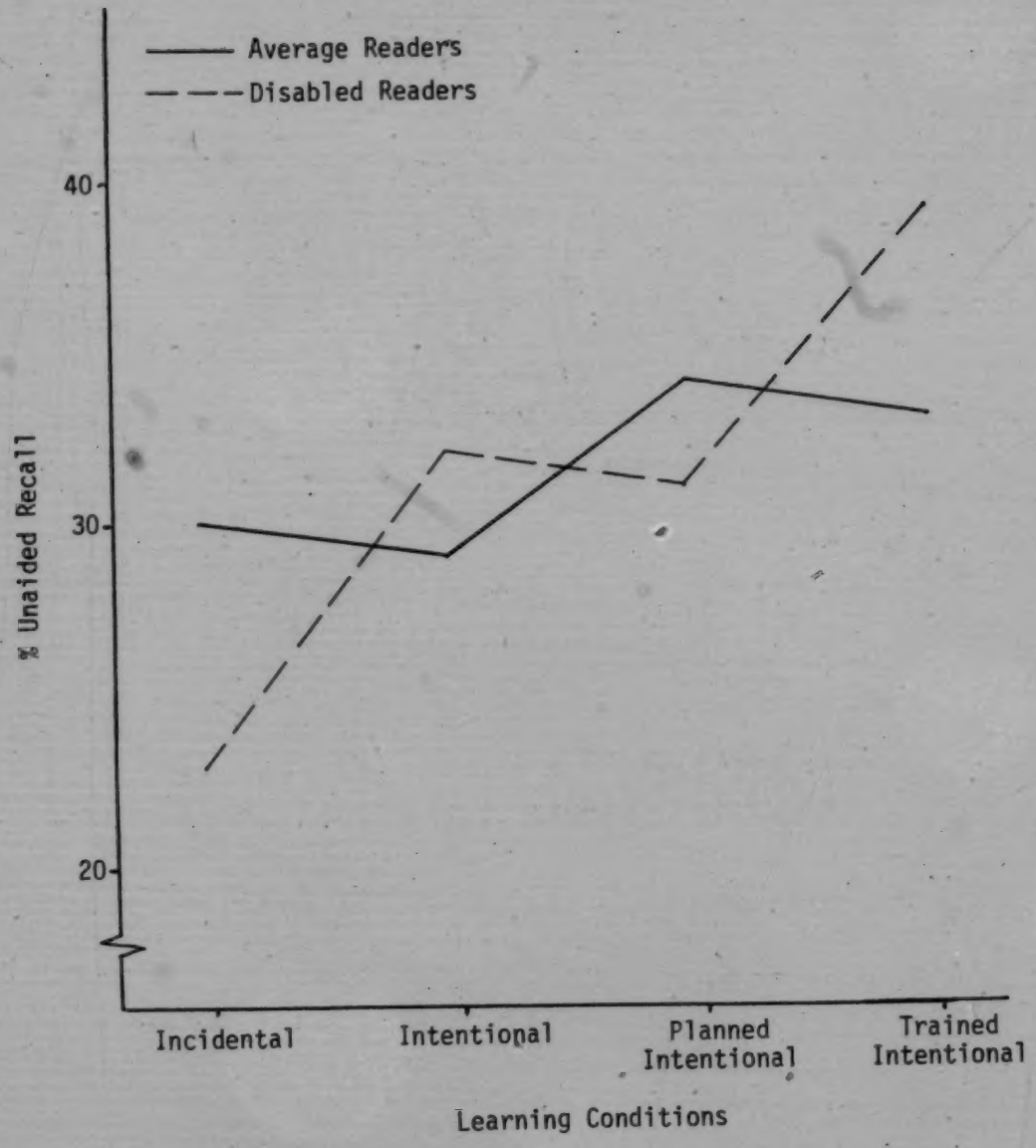

Figure 1

Recall Means of Groups x Conditions
(Collapsed over Idea Unit Levels)

Table 4

Newman-Keuls Test of Groups x Conditions Interaction for Recall

Average Readers	Condition 2	1	4	3
$\bar{x}$ recall	17	17.8	19.87	20.33
$\bar{x}_i - \bar{x}_j$		.67	2.74	3.2
			2.07	2.53
				.46
$Q = \frac{\bar{x}_i - \bar{x}_j}{\sqrt{MS_w/n}}$		.43	1.79	2.09
			1.35	1.65
				.30

Disabled Readers	Condition 1	3	2	4
$\bar{x}$ recall	14.13	18.06	18.8	23.53
$\bar{x}_i - \bar{x}_j$		3.93	4.67	9.4
			.74	5.47
				4.73
$Q = \frac{\bar{x}_i - \bar{x}_j}{\sqrt{MS_w/n}}$		2.57	3.05	6.14**
			.48	3.58*
				3.09*

* Qcv (.05) for df = 112	2.80	3.36	3.68
**(Qcv (.01) for df = 112)	(3.70)	(4.20)	(4.50)
		2.80	3.36
		(3.70)	(4.20)
			2.80
			(3.70)

and from intentional to trained intentional ($Q = 3.09$, $df = 1/112$, $p \leq .05$) significant recall performance increases for disabled readers were indicated.

T-tests (Winer, 1970) on group means for total idea units recalled within each condition were carried out, and using a one-tailed interpretation of the results, a marginally significant difference between groups was found in the incidental learning condition ($T = 1.56$, $df = 1/28$, $p \leq .06$) and a significant difference in the trained intentional learning condition ($T = 1.83$, $df = 1/28$, $p \leq .039$). Referring back to Figure 1, it can be seen that the recall performance of the disabled reader is well below that of the average readers in the incidental learning condition, and yet in the trained intentional condition, the disabled readers' recall is significantly better than average readers.

A highly significant main effect for levels was found ($F = 466.64$, $df = 3/336$, $p \leq .0000$), whereas no significant interactions between groups or conditions by idea unit levels was indicated. The increase across levels is shown in Figure 2. Multiple comparisons of idea unit level means using the Newman-Keuls procedure revealed a significantly greater amount of level 3 and level 4 idea units recalled, in comparison with levels 1 and 2 respectively; an increased amount of level 4 idea units recalled versus level 3, and no difference with respect to the amount of level 1 versus level 2 idea units recalled.

Figure 3 shows the graphic depiction of the comparative performance for average and disabled readers over conditions for percentage

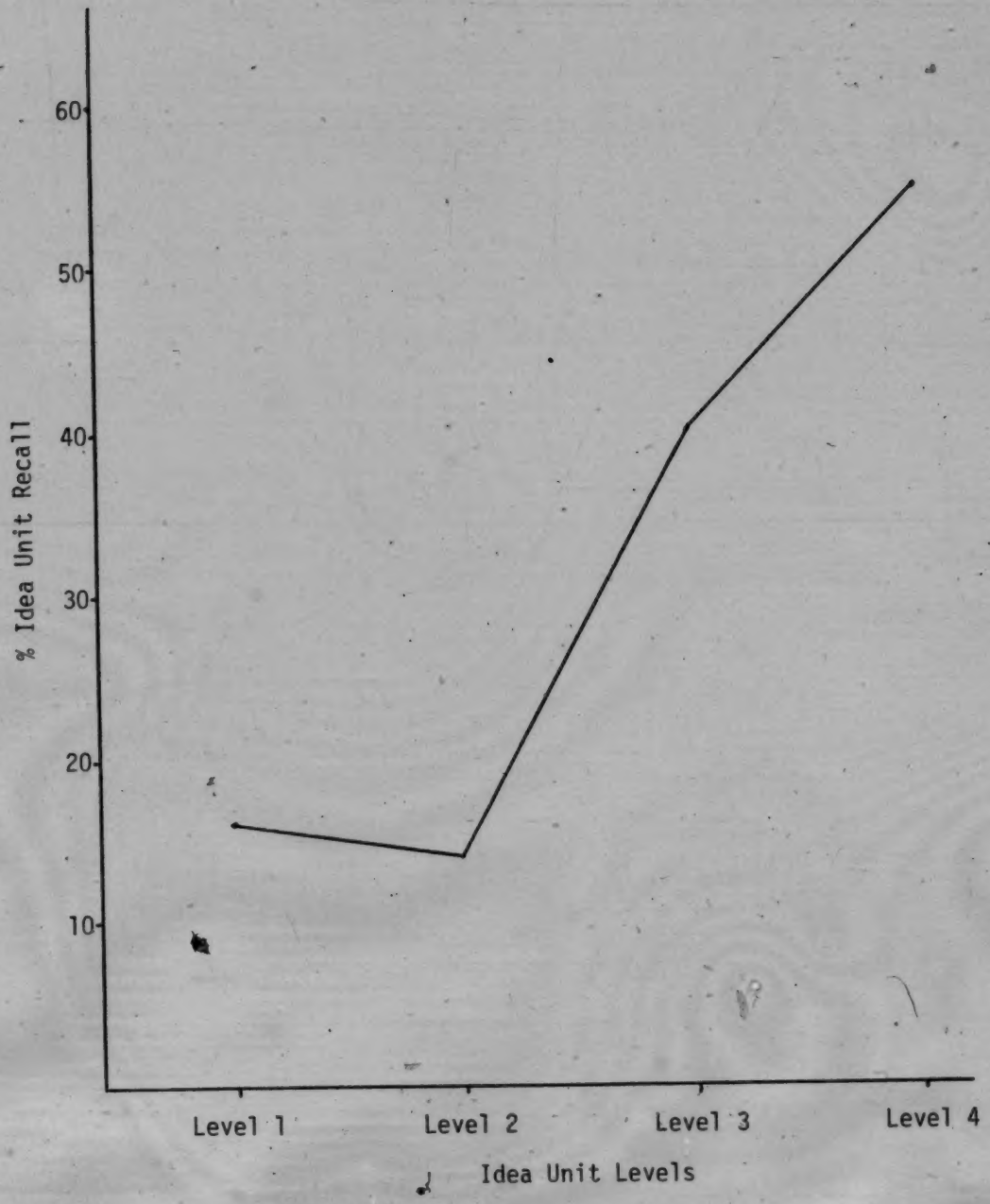

Figure 2

Idea Unit Recall Means
(Collapsed over Groups and Conditions)

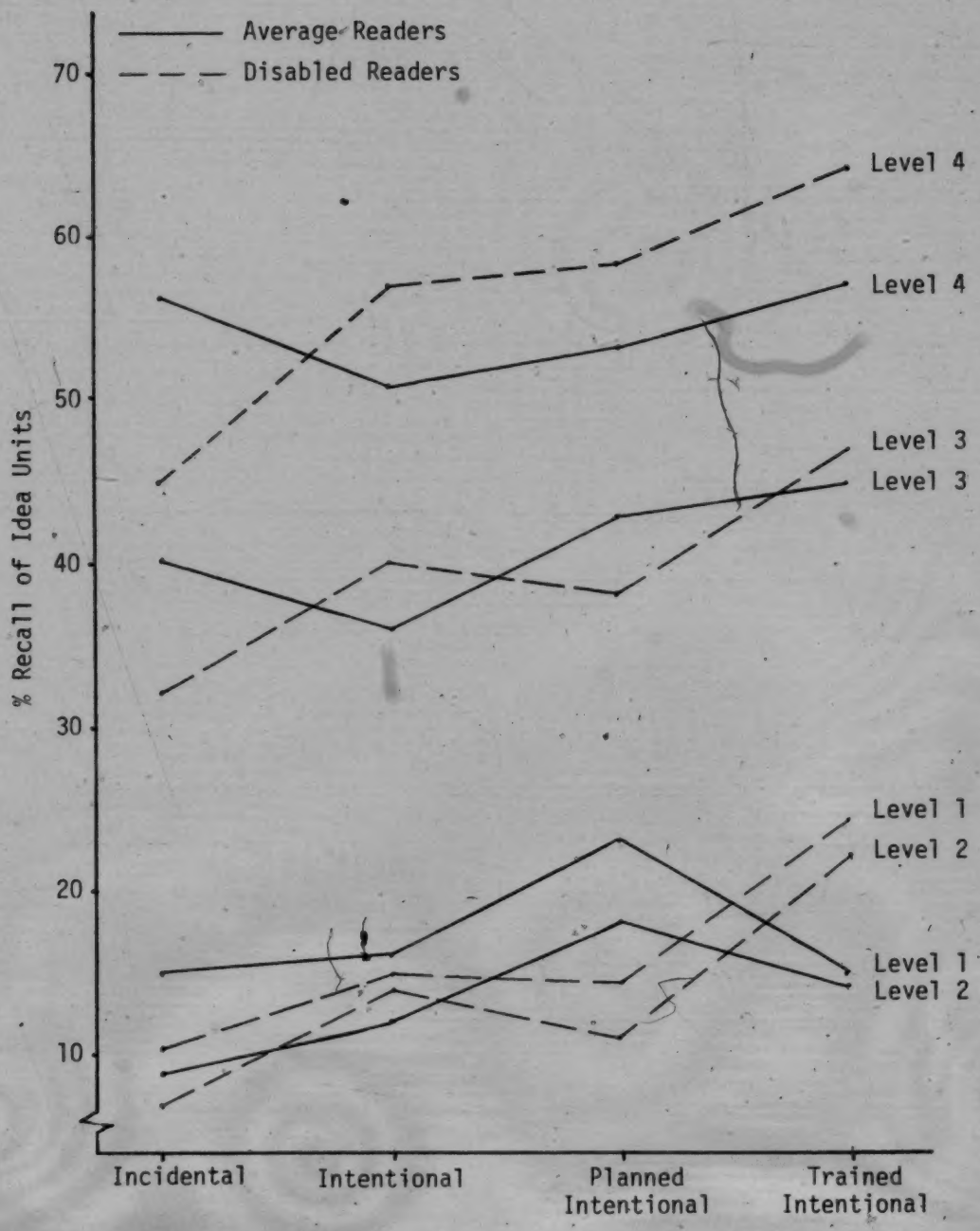

Figure 3

Recall Means for Groups x Levels x Conditions

recall of levels of idea units. For average readers, a fairly consistent pattern of level of idea unit recall across conditions was revealed. In contrast, there appears to be a notable gain in idea unit level recall means from the incidental to the trained intentional learning condition for the disabled readers.

Recall: Discussion

The results of the present investigation provide support for the notion of a positive relationship between recall performance and the level of importance of idea units to the overall story structure, as was predicted in Hypothesis 1. Although the predicted hierarchical increase across levels was not consistently upheld, the differences that were obtained in this investigation (i.e., level 1 = level 2 < level 3 < level 4) reveal substantial support for the notion of a levels of importance distinction among idea units. In the Brown and Smiley (1977) study of recall of story idea units across age levels 8, 10, 12 and 18, consistent reliable increases in recall from level 1 to level 4 idea units were obtained. The fact that the Brown and Smiley (1977) subjects were randomly selected from the total school population, whereas subjects for the present study were selectively screened for average and below average reading competence prior to their random assignment to differential learning conditions might account for the discrepancy in results. However, it should be noted that a recent study by Martinez, Ghatala and Bell (1980) using a sample of grade seven readers (including average and above average readers) as well as poor readers, resulted in a recall pattern across idea unit

levels very similar to that obtained in the present study (i.e., no reliable difference between level 1 and level 2). Thus, the results from this and a completely independent study shed some doubt on the generalizability of the original Brown and Smiley (1977) study. Indeed, it may be that there are only three as opposed to four distinct levels of importance of idea units for simple passage recall.

Previous studies using a paradigm similar to the present study have found that, in general, the recall of good readers is more sensitive to variations in importance than recall of poor readers (Smiley, Oakley, Worthen, Campione and Brown, 1977; Martinez, Ghatala and Bell, 1980). For this reason, it was anticipated that the baseline pattern of recall by idea unit level in the incidental condition would reveal a greater amount of level 3 and 4 units for average over disabled readers. Accordingly, since it was assumed that the subsequent learning conditions would increasingly promote disabled readers to perform more like their average reading peers, it was anticipated that improvements in the performance of disabled readers would be concentrated around greater recall of level 3 and level 4 idea units. Thus in Hypothesis 1-1, it was postulated that the mean recall of high idea units versus low level units would increase across experimental conditions for reading disabled subjects. In general, this hypothesis was not supported by the results obtained in the present study. Unlike the Smiley et al. (1977) and Martinez et al. (1980) studies, in which significant differences of greater recall for average readers over disabled readers on level 4 and level 3 ideas than on level 2 and level 1 ideas were reported, no such differences

were apparent in the present investigation. There was, however, an indication of significantly greater recall of level 4 ideas and a trend near significance level for greater recall of level 1 ideas for average over disabled readers in the incidental learning condition. This discrepancy in results might be attributed to the fact that the disabled average readers in the former studies were matched according to age level, whereas the present study, in an effort to reduce the variability of the groups as much as possible, matched the samples according to reading level.

Notwithstanding these initial disparities, it would still be logical to expect that any significant performance increments across learning conditions for disabled readers would be attributable to an increase in recall of level 3 and 4 ideas. This, in fact, was the result reported by Brown and Smiley (1977) for college level students who were assigned to intentional, as opposed to incidental learning conditions, as well as for the younger age group (i.e., grades five, seven and eleven) who demonstrated the spontaneous use of underlining or note-taking strategies. The authors put forth as a rationale for this effect, the notion that:

> The effective learner should not direct extra study to the trivial units, and therefore one would not expect an increase in recall of nonessential information. . . . Thus, following intentional study, the college student should improve his recall, but his improvement should be differentially distributed across the various degrees of importance of the text elements. (Brown and Smiley, 1977, p. 1077)

Although the disabled readers in the present study showed performance increments in all of the experimental treatment conditions (i.e., no significant difference between groups in the intentional and

planned intentional learning conditions, and significantly greater recall than average readers in the trained intentional condition), the improvement was not attributable to a greater amount of recall of level 3 and 4 idea units. There was no significant interaction for groups by levels of idea units obtained in the analysis and even though the disabled reader made significant gains in recall performance across learning conditions, the improvement was fairly equally distributed across levels of idea units.

Once again, the results of the present study challenge the generalizability of the Brown and Smiley (1978) study. It appears that intentional learning conditions result in qualitatively superior (i.e., more high level idea units) recall for college level readers and not for disabled readers in the seventh grade. It is unfortunate that the Brown and Smiley (1978) study of incidental versus intentional learning conditions was limited to only college level readers, for we might have a much clearer idea of where the qualitatively facilitative effects of intentional learning conditions break down. The results of related experiments with several age groups in the same research report (Brown and Smiley, 1978) would suggest that the breakdown occurs after the eighth grade, since younger subjects do not appear to have yet acquired the ability to make finite distinctions concerning the importance of text segments for anticipated recall tasks. The matter does appear critical for resolution, due to both practical and theoretical concerns, and thus further investigation of this area is recommended.

As was indicated previously, past studies using a research

paradigm similar to that of the present investigation (Martinez et al., 1980; Smiley et al., 1977) have consistently found significant main effects for differences in recall between average and disabled readers. In accordance with the results of these studies, Hypothesis 1-2, which predicted greater unaided recall for average over disabled readers in the incidental condition was supported. It would appear that this effect is particularly robust in that the recall of average readers is superior to that of disabled readers whether they are matched on age or according to reading ability. It is, however, suggested that matching according to reading level, which is the framework of the present research, would appear to be more fruitful for investigations involving the reading process, since performance differences are more readily attributable to treatment effects as opposed to reading ability effects and/or treatment effects. In addition, treatment differences can be directly compared with the performance of average readers as a sort of baseline comparison.

Unfortunately, there were no studies found in the literature utilizing the present paradigm to examine attentional differences between average and disabled readers. There are, however, numerous studies to indicate that attentional differences between good and poor readers are a major detrimental factor for the latter group to general educational achievement (Keogh and Margolis, 1975) as well as with respect to memory and recall performance in particular (Dallago and Moely, 1980; Torgesen, 1977). It is of interest to note that in all of the above investigations, there is some reference to the disabled readers' lack of an active or planful approach to experimental

tasks. A recent study by Forrest and Waller (1979) resulted in similar findings with respect to the comparative development of meta-comprehension and the development of reading strategies for average and disabled readers. A later study by Forrest and Waller (1980) suggested that both metacognition and the ability to control such cognitions characterize the reading proficiency of upper elementary and good readers.

In view of the collective findings of the above studies, it appeared reasonable to suggest that if it was possible to instruct poor/disabled readers to self-regulate their attentional abilities to the control of metacognitive aspects of the reading process that their reading performance would resemble that of the average reader. This was the basis for Hypotheses 1-3 and 1-2 which predicted respectively that the unaided recall performance for disabled readers would increase across learning conditions, and that all of the intentional conditions would result in a substantial decrement of the initial superior recall level of average over disabled readers in the incidental condition. Thus, with respect to the present study, it was anticipated that after receiving direction for self-regulation of attention strategies (i.e., intentional learning conditions), that the recall for disabled readers should resemble that of average readers (i.e., no difference between groups).

Additionally, although it was not stated in hypothesis form, it should be noted that a basic assumption of the present research was that in normal reading development, the reader at the upper elementary grades is already quite adept at the flexible and

efficient differential allocation of attention to maximize reading performance. Therefore, it was anticipated that the differential learning conditions would not affect the recall performance of average readers, since proficient attentional allocation is characteristic of their overall development of reading proficiency.

Complex as this interrelationship might seem, all of the above postulations were supported in the present investigation. The mere addition of notification of a post-task recall in the pre-task instructions was sufficient for disabled readers to self-regulate their attention, to the extent that their recall performance was no different from that of the average readers in the intentional condition. Given such a dramatic improvement in performance with such minimal alteration, one is reluctant to accept the findings without reservation. It is therefore of considerable interest to note that a similar dramatic effect in the recall performance of poor readers after a brief training session was reported by Torgesen (1977). His conclusions regarding these results are consistent with the views of the present investigator and thus warrant inclusion in the present discussion:

> Thus, rather than proposing that reading-disabled children have a "specific disability" in short term memory which limits their attainment of reading skills (Guthrie & Goldberg, 197a; Koppitz, 1976), I suggest that a third variable, the efficient and organized management of cognitive resources, can be a crucial factor contributing to individual differences on both experimental memory tasks and the attainment of reading skills. (p. 577)

Although the attempt to increase attentional self-regulation through the use of pre-task metacomprehension interview questions (i.e., planned intentional condition) had only minimal incremental

effect on recall performance for disabled readers over the intentional learning condition, the effects of training disabled readers to attend to and utilize a specific metacognitive plan during silent reading (i.e., trained intentional condition) on subsequent recall were resoundingly positive. Disabled readers in the trained intentional condition not only significantly out-performed their counterparts in the incidental condition on recall, but also demonstrated superior recall over the average readers in the same trained intentional condition. The latter relationship, it should be noted, is a complete reversal with respect to the previously mentioned superior recall performance of average over disabled readers in the incidental learning condition. These results are supportive of other studies reporting improvement in recall of prose for younger students (grade four) who were induced to utilize deliberate mnemonic strategies (Christie and Schumacher, 1978) as well as for educable retarded subjects (Brown, Campione and Barclay, 1979) and poor readers (Heiman, Fisher and Ross, 1973) who were trained in specific metacognitive and attentional strategy usage.

A final observation of no recall differences for average readers across learning conditions was found in the present investigation. This finding lends substantial support to the notion that proficient attention allocation is a substantial component of normal reading development and appears to be fairly well established by the fifth grade.

Indeed, the fact that there was a performance decrement (though not significant) in recall for intentional and planned

intentional learning conditions in comparison with the incidental learning condition for average readers, suggests that other direction for self-regulation of attention tends to interfere with the spontaneously adopted strategies utilized in the incidental condition. A similar explanation of this interference phenomenon, as reported in various Soviet studies of incidental and intentional memory, has been suggested by Meacham (1972).

Although no study could be found in the literature which examined this specific postulation, the results of a recent study by Adelman et al. (1980) are of interest to the discussion here. In their study, average and above average readers at the grade three level were randomly assigned to three treatment conditions, one control and two other conditions which involved (similar to the present investigation) teacher guidance in directing children's attention during the silent reading of a passage. The results of the investigation were no differences in recall across conditions, and the authors concluded the effect of the instructional techniques was insufficiently powerful to produce main effects. In view of the results of the present investigation, it might be suggested that the above average readers at the grade three level were similar in reading proficiency to the average grade fives in the present study. Therefore attention allocation strategies were already sufficiently developed and controlled, and that any probable performance increases for average grade three readers in the guided instructional conditions were cancelled out by treating the readers as a homogeneous group. On the other hand, it may be that grade three students are too young (developmentally) to benefit

from such teacher guided meta-attention training.

Comprehension: Results

Comprehension was calculated on the basis of "n" correct responses out of a possible 10. The mean percentage comprehension for average and disabled readers across learning conditions is shown in Table 5. A 2 (groups) x 4 (learning conditions) factorial design was used to examine comprehension with the mean number of correct comprehension questions as the dependent measure. The results of this analysis are presented in Table 6.

There was a significant main effect for learning conditions ($F = 4.19$, $df = 3/112$, $p \leq .007$) and a significant interactive effect for learning conditions by groups ($F = 4.07$, $df = 3/112$, $p \leq .008$). This interaction is graphed in Figure 4. In order to determine the specific nature of the groups x learning conditions interaction, the Newman-Keuls procedure was utilized (see Table 7). For average readers there were no significant differences in comprehension across conditions, although there was a notable decrement in performance in the intentional condition, in comparison with the incidental learning condition. In contrast to the average readers, the performance differences in comprehension for disabled readers across conditions were consistently positive. A significant improvement in comprehension was indicated for both the planned and trained intentional group over the incidental and intentional learning groups respectively (see Figure 4).

For a comparison of means between groups in each experimental condition, separate T-tests were utilized. Using a one-tailed

Table 5

Mean Percentage Comprehension for Groups across Conditions

Source	Conditions			
	Incidental	Intentional	Planned Intentional	Trained Intentional
Average	76.7	64.7	66.0	72.7
Reading Disabled	64.0	62.7	76.7	81.3

Table 6

ANOVA for Comprehension Data
2 (Groups) x 4 (Learning Conditions)

Source	df	MS	F	p
Between				
Reading Groups	1	.41	.19	NS
Learning Conditions	3	8.96	4.19	≤.007
Groups x Conditions	3	8.70	4.07	≤.008
Error	112	2.14		

n = 15

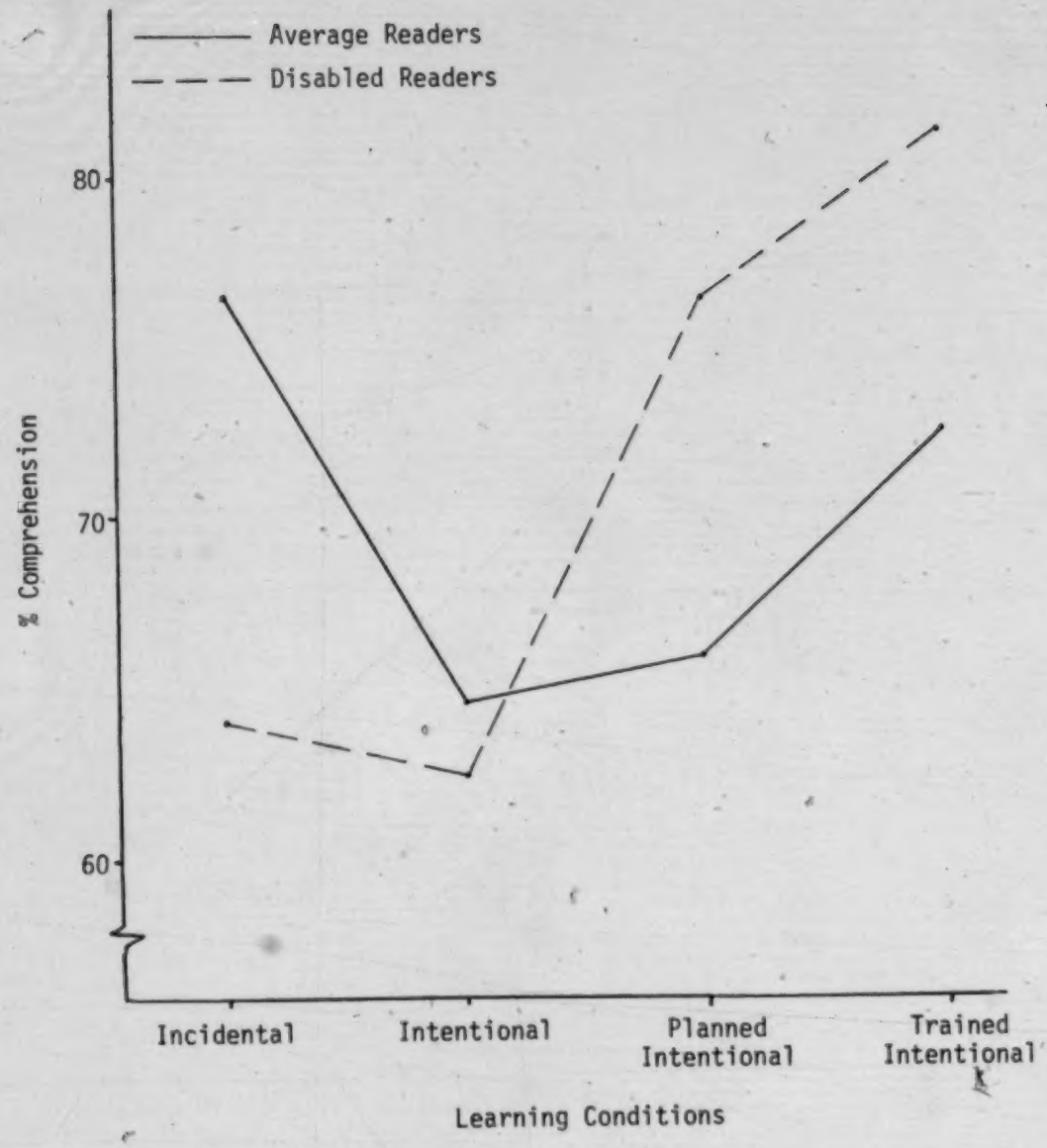

Figure 4

Comprehension Means of Groups x Conditions

Table 7

Newman-Keuls Tests of Groups x Conditions Interaction for Comprehension

Average Readers	Condition 2	3	4	1
$\bar{x}$ comprehension	6.47	6.6	7.27	7.67
$\bar{x}_i - \bar{x}_j$		.13	.8	1.2
			.67	1.07
				.4
$Q = \frac{\bar{x}_i - \bar{x}_j}{\sqrt{MS_w/n}}$		.345	2.12	3.18
			1.77	2.84
				1.06

Disabled Readers	Condition 2	1	3	4
$\bar{x}$ comprehension	6.27	6.4	7.67	8.13
$\bar{x}_i - \bar{x}_j$		.13	1.4	1.86
			1.27	1.73
				.46
$Q = \frac{\bar{x}_i - \bar{x}_j}{\sqrt{MS_w/n}}$		.34	3.71*	4.93**
			3.37*	4.59**
				1.22

* Qcv (.05) for df = 112	2.80	3.36	3.68
**(Qcv (.01) for df = 112)	(3.70)	(4.20)	(4.50)
		2.80	3.36
		(3.70)	(4.20)
			2.80
			(3.70)

test-solution, significant differences between average and disabled readers in comprehension were apparent in the incidental condition ($T = 2.31$, $df = 1/28$, $p \leq .01$), in the planned intentional condition ($T = -1.92$, $df = 1/28$, $p \leq .03$) and in the trained intentional condition ($T = -1.97$, $df = 1/28$, $p \leq .02$). An examination of the graphic presentation of the group means (Figure 4) shows that the comprehension of the disabled readers was significantly lower in the incidental condition, with performance gains in both the planned and trained intentional conditions superior to the average group.

Comprehension: Discussion

The majority of the research reports concerning the study of disabled and average readers' memory of stories have primarily concentrated on recall measures to the exclusion of comprehension measures (i.e., Brown and Smiley, 1977; Smiley, Oakley, Worthen, Campione and Brown, 1977). However, some initial efforts have been reported in which recall protocols have been examined for true and false inferences made by subjects given true or false premises (Kail, Chi, Ingram and Donner, 1977) or have separated recalled information that is consistent with the reading passage versus information that is external to the reading passage (Drum and Lantoff, 1977). Both approaches would provide some information regarding the subjects' understanding of the material read, and at least one recent discussion paper regarding the analysis of reading tasks and texts suggests that the examination of children's ability to read for meaning versus children's ability to read for remembering is a critical distinction

to make (Collins, Brown, Morgan and Brewer, 1977). For this reason, both recall and comprehension measures were included in the present investigation. The comprehension hypotheses were, in general, similar to those put forth regarding recall.

Hypothesis 2 which predicted that average readers would outperform the disabled readers in the incidental condition, was confirmed with average readers obtaining a significantly greater number of correct responses to the ten comprehension questions following recall of the story. Not surprisingly, the results of the present investigation are consistent with those of others who have examined good and poor readers on comprehension related tasks (DiVesta, Hayward and Orlando, 1979; Forrest and Waller, 1979). Divesta et al. (1979) suggested that poor readers tend to comprehend less well because they fail to take an active role in the reading process and "view the text as 'the' only source of information" (p. 105). On the other hand, Forrest and Waller (1979) suggested that poor readers do not adopt reading strategies to meet the demands of the situation and are "less able to assess comprehension and predict accuracy" (p. 5). The performance of the disabled readers in the present investigation indicates that both suggestions are indeed part of the problem, but of much greater interest is the fact that the poor reader can be directed to overcome such deficiencies, as postulated in Hypothesis 2-1.

Here it was postulated that there would be a hierarchical increase in performance for disabled readers across conditions (i.e., incidental < intentional < planned intentional < trained

intentional). With the exception of no change in comprehension performance from the incidental to the intentional condition, performance increments for the disabled readers were quite dramatic in both the planned intentional and trained intentional conditions. For these two groups, performance not only significantly surpassed that of their disabled counterparts in the incidental condition, but was similarly superior in comparison to the performance of average readers in the planned intentional and trained intentional conditions.

It is of considerable interest that, in contrast to disabled readers, no significant differences in comprehension performance were obtained for average readers. This result lends support to the notion that in normal reading development, the reader by the fifth grade routinely adopts certain metacomprehensive and meta-attentive strategies. However, the substantial decrement in the comprehension performance of the average readers in the intentional condition as compared to the incidental condition seems to suggest that the experimenter specified goal of reading to remember the information may have served to cancel out or disrupt the effectiveness of certain strategies utilized by average readers in the incidental condition. This interference phenomenon was similarly noted for average readers on recall and, as mentioned previously, would tend to support many of the Soviet research findings reviewed by Meacham (1972). In summary of these, he suggests that:

> After an activity (action) such as rehearsing, classifying, labeling, etc. is "comparatively well formed," it can then be subordinated as a means (operation) toward achieving a new goal, such as that of voluntary memory (action). Periods of production deficiency, therefore, refer to the time during which an activity is well formed but not yet subordinated to the goal of remembering. (p. 216)

Of further interest along this same line of discussion is the often reported result that, with respect to the development of memory, most children are unable to improve memory proficiency under intentional learning conditions until about eleven or twelve years of age (Smirnov and Zinchenko, 1969; Appel, Cooper, McCarrel, Sims-Knight, Yussen and Flavell, 1972). For a complex task such as reading, the age level for improvement of reading proficiency under intentional learning conditions may not emerge until after twelve or thirteen. This possibility needs to be examined in future investigations.

There were only a few investigations that could be located in the literature which were sufficiently similar in design to the present study to compare results. The first was the Forrest and Waller (1979) study in which good and poor readers from grades three and six were asked to read two stories under each of the four instructional conditions. Differences in instructions were in the form of the stated purposes for reading the passages. These included: reading for fun, reading to make up a title, reading to locate a specified piece of information, and reading to study. Other than a reduction of performance for good grade three readers and all groups of grade six readers for skim reading, there was essentially no difference for poor, average, or good readers over learning conditions with respect to changes in ability to answer comprehension questions.

There are two considerations from the present investigation that are worthy of note here. The first observation is that the average grade five control reading group in the present study were exposed to the same learning conditions as the disabled groups and yet, despite

significant gains in the comprehension performance of the latter group, there was no difference in performance across conditions for average readers. It was suggested that the results could be explained by the possibility that by the fifth grade, the average reader routinely adopts certain metacomprehensive and meta-attentive strategies for both school-related and recreational reading activities. Therefore, referring back to the Forrest and Waller (1979) results, it is quite possible that for the average and above average readers, the routine adopting of such meta-strategies made the comprehension of incidentally read stories (i.e., read for fun) equal to that of intentionally read stories (i.e., read for study) of the same difficulty level.

The second observation from the results of the present study is that the two conditions which significantly improved comprehension for disabled readers were those which directed the reader to self-evaluate and self-regulate their reading comprehension (i.e., planned intentional and trained intentional). When they were merely told that they would have to remember the story, no improvement was evident. With respect to the Forrest and Waller (1979) results in which no differences across learning conditions occurred for poor grade six readers, it would appear that a similar effect was operating. The "read to study" condition, similar to the intentional condition in the present study, was insufficient to cause the readers to exercise active and conscious control over their reading to ensure story understanding. As for the grade three readers in the Forrest and Waller (1979) study, it is most likely that the failure to find performance differences in comprehension across learning conditions is a result of cognitive

related limitations, such as an inability to utilize rehearsal to aid recall.

A recent investigation by Gordon (1979) in which differential instruction was given to above average grade five reading groups over an extended time period, does however, show that both overall and specific aspects of comprehension can be improved. Subjects who were given instruction in "the use of a megacognitive strategy for consciously integrating textual elements with other textual elements in the story and for generating content schemata (from the head) to relate to textual elements (from the story) during the actual reading of the selection" (p. 2), showed significant gains in comprehension scores over a comparable control group, as well as a group trained in using background knowledge and locating the macrostructure of the story. It should be pointed out that the discrepant results of the Gordon (1979) study, with those of the present study are most likely due to the fact that the training program of the Gordon study was more elaborate, carried out for a longer time period, and was directly related to the basal reading program. Nevertheless, the two studies are quite consistent in demonstrating support for the basic notion that proficient reading involves conscious self regulation of attention, particularly to the metacognitive aspects of the reading tasks.

With respect to the present investigation, since it was the planned intentional and trained intentional conditions that brought about the doubly significant performance gains in comprehension for disabled readers, it might be fruitful to examine each of these conditions to try to determine the major features for success.

In the planned intentional condition, subjects were pre-interviewed with questions that were intended to tap their awareness of their available reading abilities, as well as to encourage them to plan and verbalize a strategy to utilize in their silent reading of the experimental passage. Since the questions and responses were not amenable to statistical evaluation, the results are summarized in Appendix G. In general, the results indicate that in many ways, the disabled and average readers are very similar in their understanding and awareness of reading as well as how they retain information. Responses that were most often given by one group, generally were also similarly favored by the other group. In a few cases the responses were inappropriate to the question asked, or the subjects could not think of a response, but the incidence of these appeared to be evenly distributed among the two groups. For the most part, responses of both groups reflected some indication of metacognitive or metacomprehension knowledge, and the variety and creativity of such knowledge once again appeared to be fairly equally distributed between groups. For example, a major proportion of the subjects were aware that rereading a passage would result in better recall and understanding of it; that a review of important story parts after reading a passage would facilitate better recall of the story; and that if they were expected to remember a story after reading it, they would have to read more carefully or use external resources (such as writing it out or rehearsing it to a friend). Essentially, the interview data suggest that students at both age levels are fairly sophisticated in their awareness of strategies that promote reading proficiency and learning

from text.

The similarity of the interview results was not suprising. At the outset, it was assumed that the older disabled readers had access to and utilized an extensive repertoire of metacognitive strategies in many of their other academic tasks, and indeed everyday functioning. They do not, however, tend to apply these same strategies to the normal reading situations, but as this study indicates, can be directed to do so. Questions such as those employed in the planned intentional condition, prior to the silent reading of a short story at the instructional level of the disabled reader, appear to have the effect of making the reader more conscious of his/her own involvement in the reading process. They tend to help the reader to self-monitor his comprehension of the story and to self-regulate his attention to such aspects while s/he is reading it. For the average grade five reader, it appears that such aspects are routinely self-adopted in reading tasks. The findings reported here tend to support the conclusions drawn by Pace (1980) after an overview of the literature concerning metacomprehension and school-aged children's reading:

> Although much additional research is needed one conclusion seems fairly evident. Metacomprehension is not a unitary phenomenon, but encompasses several kinds of abilities and degrees of awareness. These may appear at different ages, but they also interact with task demands and situations, so that they may be manifest in certain circumstances but not in others. . . . these studies do show that various manipulations can be employed which will increase the possibility that children will attend to significant features of texts. If this is the case, then instructional procedures could be developed to train students to become sensitive to their own comprehension. (pp. 7-8)

The trained intentional condition was the most effective learning condition for disabled readers with respect to comprehension

performance. Subjects in this condition were given four, 45-minute training sessions prior to the experimental task in which a metacognitive reading strategy (i.e., SQ3R technique, see Appendix D) was taught and practiced. The major aspects emphasized in this approach were: a systematic way of approaching a reading task (i.e., skim, self-question, read, review and recite); having the student monitor the procedure independently; critically reviewing actual performance after each session; self-planning of ways to improve performance; and group discussion of strategies and story recall. This combination, it appears, was even more facilitative than the previously described planned intentional condition.

It would appear that what the trained condition might have over the planned condition is an overall procedure to specifically apply to a reading situation and practice prior to the experimental task in actually doing it. In the planned condition, strategies were self-generated and no suggestion, evaluation, or feedback was offered by the experimenter as to the suitability of responses to the pre-task interview questions. In their study of metacognitive knowledge about reading with grade three and six students, Forrest and Waller (1980) indicated that "the skills that were mentioned by older/better readers tended to be part of a general 'plan-of-attack' rather than isolated strategies." Thus, older students do appear able to self-generate effective general reading strategies with sufficient other direction, as indicated by the successful improvement in comprehension performance of the disabled in both the planned intentional and trained intentional condition. The trained intentional condition, additionally, appears to

help disabled readers to orchestrate such strategies more effectively for a specific reading task and thus improve performance even more so. It should be further pointed out that, even though the SQ3R approach did not help to enhance the comprehension of average readers in this study, it has been demonstrated that more elaborate, long-term, and intensive programs, emphasizing "metacognitive strategies for consciously integrated textual elements . . . and for generating content schemata (from the head) to relate to textual elements (from the story) during the actual reading of the selection" (Gordon, 1979, p. 2) can lead to a significant improvement of reading comprehension for "top" grade five readers.

The other feature of the training condition that may also have contributed to the improvement in comprehension performance over and above the planned intentional group is an emphasis on the self-generation of questions prior to and during reading. André and Anderson (1978) examined the effects of using self-questioning as a study technique with high school students and found significant improvements in comprehension for the trained group, improved performance for students using self-questioning without training, and finally no difference for a control group who merely re-read the initial passage. The authors suggested that the results might best be interpreted according to a depth-of-processing notion of cognitive psychology (Craig and Lockhart, 1972) in that the self-questioning promoted an increase in depth or cognitive analysis which led to greater retention. Although this may indeed be a part of the explanation, the results of the present study indicate that

improved or efficient comprehension is substantially based upon the reader's active monitoring of textual information, and conscious self-regulation of the reading process.

As a final note on the discussion of the comprehension results in the present study, it appears that the use of comprehension measures can add substantially to the overall interpretation of research results. In the past, researchers have tended to focus their investigations upon the actual questions, in terms of the position of the questions, timing of questions, response mode of questions, and other such matters (Anderson and Biddle, 1975). The results of this study suggest that we should start broadening the investigative horizon of reading comprehension, from questioning as an after-reading activity to other equally important concerns such as student-task variables, effects of learning conditions, and relation to memory performance. Ribovich (1977) sums up the situation by stating:

> Perhaps more crucial in determining whether students will be successful or unsuccessful in comprehension is what happens as preparation before reading. (p. 13)

In her dicussion of the development of comprehension through strategies other than questioning, Ribovich (1977) appears to have captured most of the crucial elements to improve comprehension as indicated by the results of the present investigation, and therefore would seem appropriate for review in this discussion. She notes that instruction in reading comprehension should involve:

> (1) specifying content expectations in a variety of forms and then reading with a focus on the expected and unexpected, and (2) becoming attuned to the structure of ideas in material through writing experiences. Those students experiencing significant problems in comprehension may be helped by (3) being encouraged to focus on making sense of

> their reading through self-monitoring, and (4) having extensive experiences with concept development and thinking processes prior to reading particular material. (p. 11)

Recall and Comprehension: Discussion

The collective results of the present investigation call forth an issue that has not been examined to any degree in the literature, and yet appears to be one of major theoretical and practical import. Specifically, the issue concerns the relationship between memory and comprehension in reading. In the literature, the two terms recall and comprehension are often used interchangeably, and the majority of the major theoretical models of reading comprehension treat the two synonymously (Kintsch, 1977; Rumelhart, 1974; Stein and Glenn, 1977). However, there is a strong indication in the results of this study that the two areas need to be separately explored and examined.

Perhaps the best way to argue this point is through a review of the recall and comprehension performance of the disabled readers which changed substantially across learning conditions. In accordance with the traditional perspective, it was anticipated that, since recall and comprehension are considered essentially synonymous, the performance increments across learning conditions would be equivalent. However, this did not turn out to be the case.

Figure 5 shows the percentage recall and comprehension scores for disabled readers across learning conditions. The incidental condition was intended as a baseline performance measure, and both recall and comprehension scores were significantly lower than average readers to begin with. Moving horizontally across conditions, the

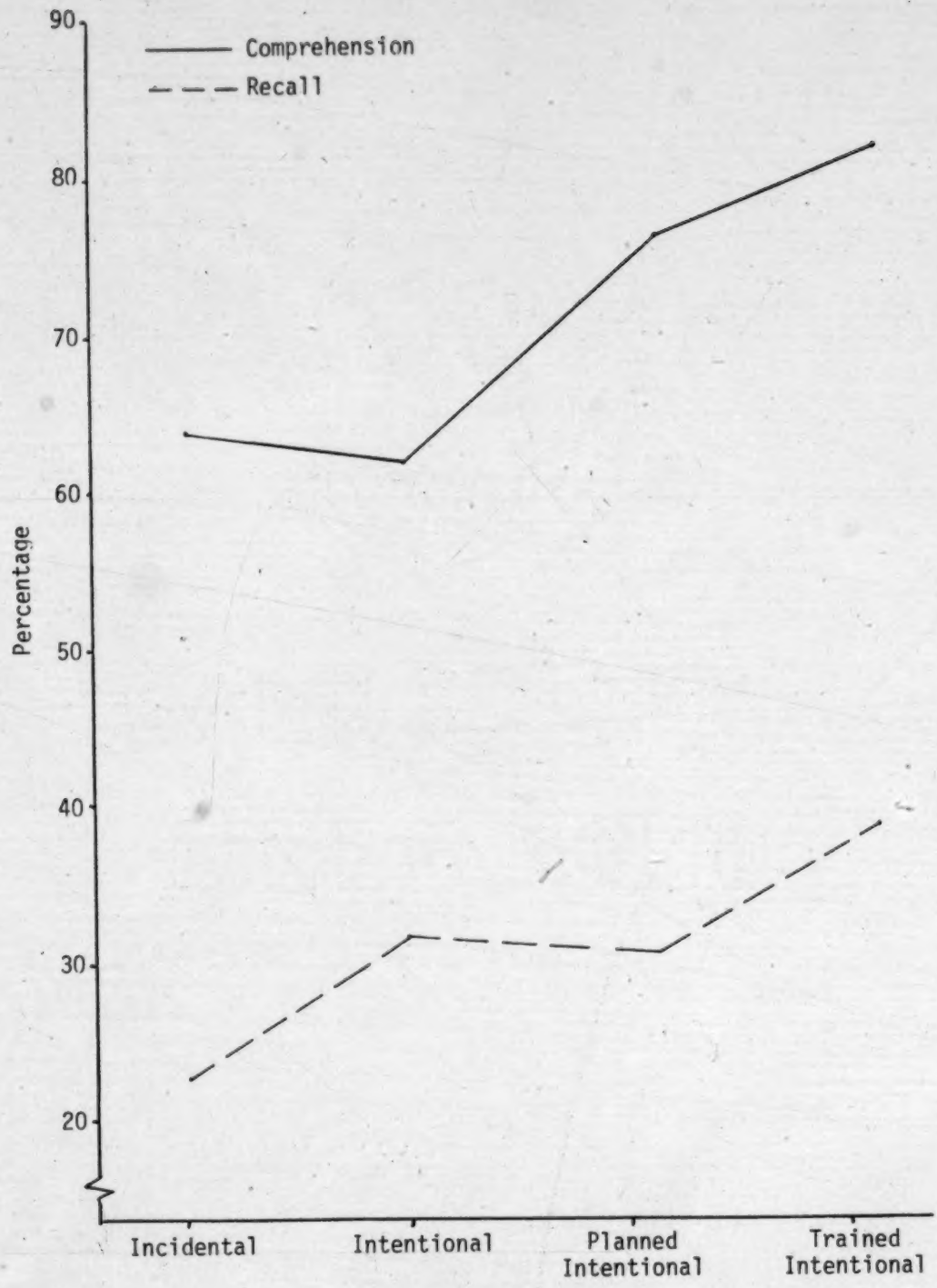

Figure 5

Recall and Comprehension Means for Disabled Readers across Learning Conditions

intentional condition merely notified the subjects of a subsequent recall requirement immediately following the silent reading of the passage. It would appear from the results that subjects primarily regarded the activity as a memory task and their attention was focused on the rote retention of passage information, since comprehension remained the same, while story recall improved. Interestingly, the effects are reversed in the planned intentional condition. Here, a significant improvement in comprehension was apparent and yet the unaided recall level was maintained at the level achieved in the intentional condition.

A plausible interpretation of these results would be that the pre-task interview questions were effective in triggering subjects to review available metacognitive and metacomprehension strategies, with the result of their subsequent selective application of such to the experimental reading task. Since there was no increase in recall, it would seem that the strategies selected for application to the reading task in the planned intentional learning condition may have been of the type that promoted aspects such as self-monitoring for meaning, or attempting to integrate interrelating ideas, as opposed to meta-comprehension strategies such as rehearsing, or labeling.

The substantial performance increments for both comprehension and recall in the trained intentional attention group would suggest that the training of a systematic metacognitive approach to a reading task allows the subject to integrate available metacomprehensive, meta-attentive, and metamemorial strategies which result in optimal reading proficiency.

In summary, it should be noted that these comments regarding the possible distinction of comprehension versus recall are at best informed speculation at this point. There is a need to develop a broad empirical base of investigations dealing specifically with this issue before such notions can be incorporated effectively into theoretical and applied endeavors. A recent discussion by Collins, Brown, Morgan and Brewer (1977) is a good example of how to begin to build such an investigative framework through an in-depth analysis of both task and text, and how additional social, communicative and related demands imposed by the classroom situation affect the child's development of reading proficiency. They sagaciously point out that:

> We suspect that there are general teachable strategies that young children normally learn by trial and error which greatly facilitate his performance on these tasks. We therefore propose a study of these strategies with an eye toward making them an explicit part of reading education. (Collins et al., 1977, p. 1)

The present study results would seem to indicate that this direction is an appropriate one.

Passage Reading Time: Results

Passage reading time was recorded for all subjects and the results were analyzed using a 2 (groups) x 4 (conditions) analysis of variance (Table 8).

Significant mean effects were found for both groups ($F = 7.09$, $df = 1/112$, $p \leq .008$) as well as conditions ($F = 11.53$, $df = 1/112$, $p \leq .000$). The graphic representation of these results (Figure 6) indicates that disabled readers took longer to read the passage in

Table 8

ANOVA for Passage Reading Time
2 (Groups) x 4 (Learning Conditions)

Source	df	MS	F	p
Between				
Reading Groups	1	6.88	7.09	≤.008
Learning Conditions	3	11.19	11.53	≤.000
Groups x Conditions	3	1.55	1.60	NS
Error	112	.97		

n = 15

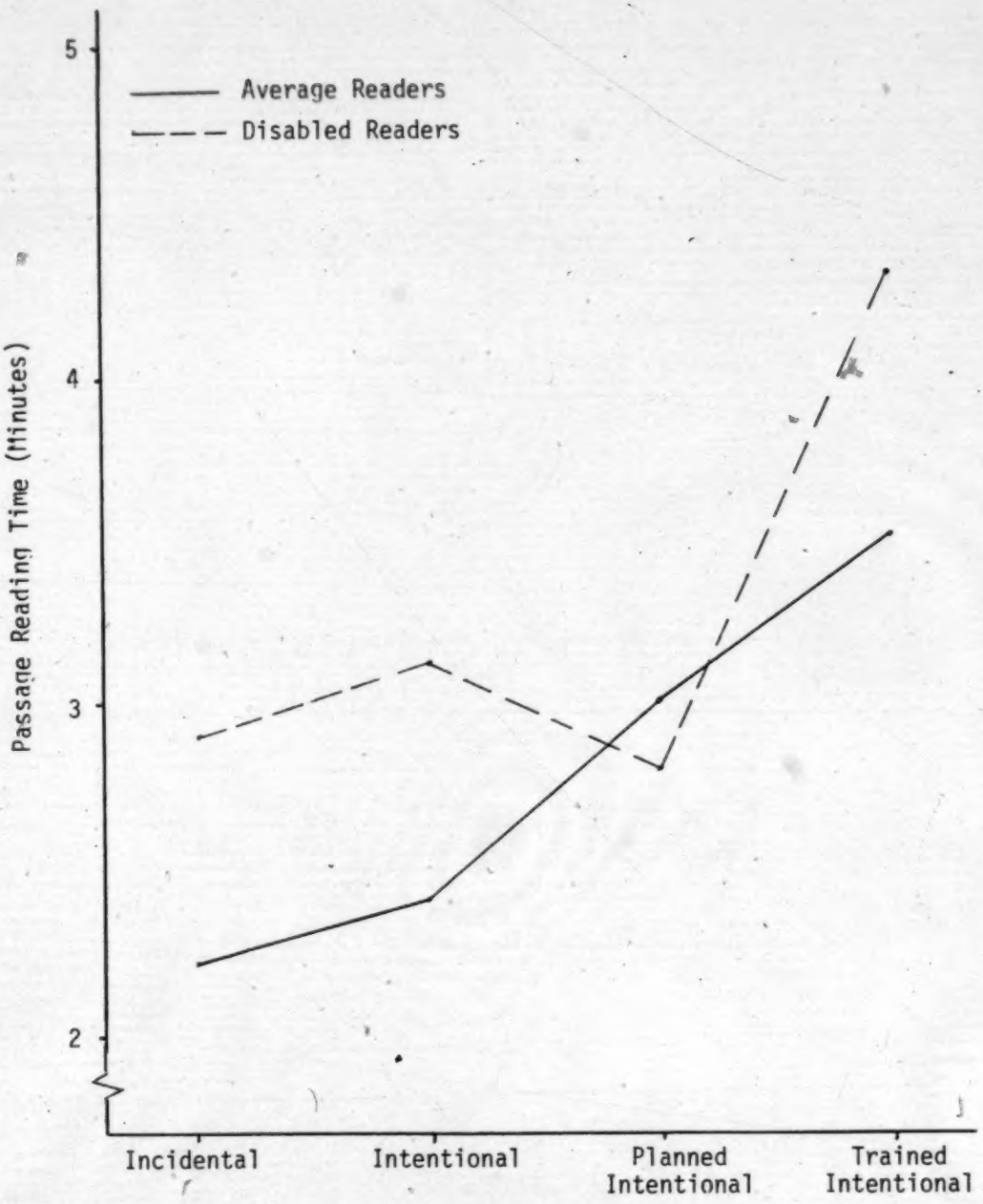

Figure 6

Passage Reading Time Means for Groups x Conditions

comparison with the average readers and that for the most part, the passage reading times increased from the incidental, to the intentional, to the planned intentional, to the trained intentional learning condition.

Passage Reading Time: Discussion

Passage reading times were recorded as an additional behavioral observation of average versus disabled readers, across the four learning conditions. Hypothesis 3 which predicted increased passage reading times across conditions (i.e., incidental < intentional < planned intentional < trained intentional), was based on the assumption that if the learning conditions were in fact instrumental in promoting subjects to adopt self-regulatory strategies during silent reading, the utilization of such should increase reading time.

For the most part, the results support this hypothesis. In addition to the statistical data, several of the responses of subjects from the pre-task interview question data provide support for this notion. For example, some of the favored strategies indicated by the planned intentional subjects (Appendix G) included such things as re-reading the passage, or reviewing the important parts. Both activities would require increased passage reading time. In fact, for the final pre-task interview question "What will you do to make sure that you remember as much of the story as you can?" almost half of the average readers mentioned that they would read it very carefully, or slowly, or pay attention to it.

Support for the interpretation of present results was found in

a study by Samuels and Dahl (1975) who found that both fourth graders and college readers adjusted reading rates for the purpose of reading for general versus detailed information. It might be pointed out at this time that despite the extensive literature on reading flexibility, the present potentially fruitful area of investigation (i.e., learning conditions and reading rate) has not yet been systematically or conclusively examined (Rankin, 1974).

The only exception to the expected reading rate increase across learning conditions was found in the decreased passage reading time for disabled readers in the planned intentional condition. This discrepancy is somewhat difficult to explain. It may be that subjects in this group did not view the reading task as primarily a recall task as they did in the other two intentional learning conditions and therefore relied on meta-attention and metacomprehension strategies, as opposed to metamemory strategies which might be more time consuming. The combined recall and comprehension data (Figure 5) would support this explanation.

The other hypothesis for passage reading times predicted that average readers would in general have faster reading times in comparison with disabled readers. This postulation was based on the assumption that disabled readers are not proficient processors of the visual information in text and might well be deficient in the "automatic processing" factor that LaBerge and Samuels (1974) claim is essential for proficient reading. The data from the present investigation were consistent with this perspective. Certain caution should be registered, however, in assuming that slow reading is related to

poor reading, and that fast reading is related to good reading. As Farr (1969) has pointed out, studies have been reported in which good and poor comprehenders were both fast readers, and vice versa. As the present study suggests, the context of the reading situation seems to be a confounding variable with respect to comprehension and reading rate. Indeed as it was pointed out above, the reading speed of the disabled readers was decreased for planned intentional learning conditions, to the degree that their average passage reading time was slightly lower than that for average readers in the same condition and yet their comprehension scores were significantly higher than average readers. Thus it appears that this interrelation should be explored further in future investigations of this kind.

Before concluding this section, a brief comment on other behavioral observations is in order. Appendix H summarizes the frequency of behaviors observed during silent reading with a breakdown for average and disabled readers. It would appear that behaviors such as lip movements, holding pages up off the table, moving the head left to right, and using markers as a guide for reading place are really idiosyncratic reading habits since they are noted over all learning conditions with relatively similar frequency for disabled and average readers.

On the other hand, behaviors more reflective of metacognitive strategy usage (i.e., scanning, rehearsal, and referring back to story parts already read) seem to be most concentrated at the trained intentional learning condition, for both average and disabled readers. Only a scattering of these behaviors was apparent for the planned

intentional condition, and none of the behaviors were apparent in the incidental condition.

In general, the behavioral observations provide only minimal additional information to the present study.

CHAPTER 6

CONCLUSIONS AND IMPLICATIONS

There are a number of significant findings resulting from the present investigation. With respect to recall performance, it appears that average and disabled readers, matched for reading level, are similar in their tendency to remember information that is most important to the overall story structure (i.e., level 3 and 4 idea units) and less likely to recall information that is less central to the story (i.e., level 1 and level 2 idea units). Other studies have shown that this tendency is apparent over a wide age-range of subjects (i.e., grade three to college level). Though Brown and Smiley (1977) have suggested that there are four hierarchically arranged levels of importance in story recall, the results of the present study (i.e., level 1 = level 2 < level 3 < level 4) do not totally support their conclusions. An independent study by Martinez, Ghatala and Bell (1980) revealing a recall pattern similar to that of the present investigation, suggests that there may be only three distinct levels of importance in short story recall. This matter requires further investigation for clarification.

A further discrepant result was obtained in the present study regarding qualitative differences between average and disabled readers and recall of level of importance idea units. Although the baseline performance (i.e., incidental learning condition) of disabled readers was significantly lower than average readers, the difference was

strictly quantitative as the pattern of idea unit recall was similar for both groups. These results are contrary to those reported by Martinez, Ghatala and Bell (1980) and for Smiley, Oakley, Worthen, Campione and Brown (1977) who found that average readers recalled more level 3 and 4 idea units in comparison with disabled readers. The difference might be attributed to the use of reading level matching of average and disabled readers in the present study, versus age level matching in the other studies. A further investigation to examine average readers together with reading level matched and age level matched disabled readers would help to clarify this discrepancy.

Differential instructional conditions were found to be substantially beneficial for disabled readers. The initially inferior recall performance of the disabled readers in the incidental condition was improved to the extent of no difference for the intentional and planned intentional conditions, and in the trained intentional condition the improvement was such that the recall of the disabled readers was significantly better than that of the average readers. These results support the notion that older disabled readers do have access to "top-down" attention organizing strategies but they do not tend to rely upon such in a reading situation. However, it does appear that older disabled readers can be instructed to self-adopt and self-regulate these strategies to improve reading recall. A follow-up study of the trained intentional group would further extend the present findings to determine if the strategy training can be maintained over a lengthy time period (i.e., five or six months).

In general, the idea unit paradigm appears to be a particularly

useful instrument for the examination of variances in recall performance. It appears to be flexible enough to accommodate a wide range of task, subject and context variables that influence the reading of text. With respect to the present study, evidence to support the notion of "cognitive" aspects of attention, as well as the notion of the zone of potential development was obtained. Though certain discrepancies of the results reported here with previously reported data were identified, the paradigm appears to be sufficiently robust for continued use in future investigations.

Although a separate comprehension measure is not typically included in the levels of idea unit studies, experimenter devised comprehension questions were addressed to all subjects following their recall of the story in the present investigation. The inclusion of such a comprehension measure was found to be highly informative in the overall interpretation of the results. As was the case for recall, disabled readers were found to be significantly lower with respect to comprehension performance in comparison to average readers in the incidental condition. However, in contrast to the immediate improvement in recall noted for disabled readers in the intentional instruction condition, no improvement in comprehension was noted. In addition, whereas the recall improvement for the intentional condition was simply maintained at a similar level for disabled readers under planned intentional conditions, a doubly significant improvement in comprehension was observed in this condition. Here it was observed that disabled readers significantly improved their comprehension performance over their peers in the incidental condition, as well as

over the average subjects in the planned intentional group. Finally, in the trained intentional condition doubly significant (i.e., across conditions and across groups) improvements in both recall and comprehension were observed for disabled readers.

These findings suggest that recall and comprehension are separate processes that mutually affect overall reading proficiency. This distinction is not widely noted in the literature, though it would seem that the issue would be extremely important for both theoretical and applied considerations in future investigations. In a similar vein, the fact that major recall and comprehension performance increments for disabled readers were differentially observed across instructional conditions may be indicative of a functionally significant link between attentional self-regulation and recall and comprehension processes as they relate to reading proficiency. Again, the issue warrants further exploration in future investigations. As a start, researchers could simply add a comprehension component to their studies of story recall, as was done in the present investigation.

The performance of average readers in this study was of interest in that no significant recall or comprehension performance differences were noted across differential instructional conditions. This result is supportive of the initial contention that top-down attention strategies are already well developed in the average grade five reader, and that such are probably routinely applied in any reading situation. It was, however, noted that there was a decrement in recall performance for intentional and planned intentional conditions as well

as in comprehension performance in the intentional condition. It would therefore seem that the imposition of an externally given goal tends to disrupt or interfere with incidentally efficient strategies that are normally adopted by average grade five readers, and thus results in a reduction of performance. Meacham (1972) has advanced a discussion to this effect using Soviet studies of voluntary and involuntary memory as a basis for his arguments. Further study of this phenomenon, across a variety of tasks, subjects and age levels would help to gain insight into this seemingly potentially fruitful area of investigation.

The pre-task interview data, behavioral observation data, and the passage reading time data were of limited use in the present investigation, and would appear most effective as secondary sources of information in future studies of this type.

Taken together, the present results have major implications with respect to a number of issues that were discussed in the literature review. These will be separately reviewed in the discussion that follows.

Implications for a Cognitive Model of Attention

The utility of any model of cognitive processing is reflected in the questions and the research that it stimulates. The recent literature concerning models of attention has pointed to the limitations of existing models (Douglas and Peters, 1979; Gibson and Rader, 1979), and the need for a model of attention that adequately deals with both the cognitive and perceptual aspects. Though no such model has been fully formulated, several researchers (Neisser, 1967; Gibson

and Rader, 1979; Douglas and Peters, 1979; Hochberg, 1978; Brown, 1978) have presented conceptual discussions of the various aspects that a cognitive attention model would comprise.

Some of the central features that have been attributed to a cognitive model of attention are: attention is inextricably tied to cognitive development; attention plays a strategic role in the child's learning processes; optimal attention becomes increasingly apparent as the child learns to control and self-regulate current perceptions and cognitions through the utilization of prior knowledge; and the flexible allocation of attention is necessary to achieve optimal and efficient information processing.

The utility of this collective conceptualization of a cognitive model of attention as an investigative perspective was explored in this study. The results of this study do appear to provide support for the notion of cognitively regulated attention processing. The manipulation of instructional conditions for the promotion of such, led to substantial increments in the recall and comprehension performance of disabled readers following a silent reading task. The critical questions that the utilization of a "cognitive" model of attention led to in this study were: to what extent can and does the subject take an active part in his/her self-regulation of attentional abilities and strategies; and what is the instructional context that promotes the subject's maximal utilization of available attentional abilities.

On the basis of the present investigation, it would appear that efforts for the formulation of a cognitive model of attention

should therefore be encouraged.

Attention and Reading

Reading is a highly complex task of information processing. Until the last decade, researchers have tended to avoid cognitive processing issues and instead have concentrated mainly upon those aspects that were readily observable and measurable. However, the fast changing direction of memory and developmental research has resulted in a wealth of insight into the importance of cognitive processes, as well as the meta-strategies that have a substantial impact on our everyday intellectual functioning. Recently, reading researchers (i.e., Hochberg, 1978; Stauffer, 1977; and Mackworth, 1977) have attempted to clarify the relationship between attention and reading using a cognitively based orientation. In view of the fact that attention can be allocated toward any of several aspects of the reading task at any one moment, it was suggested by the writer that we might distinguish between "top-down" versus "bottom-up" attentional processes in reading. The literature review revealed that the orientation for the study of attention in reading was entirely bottom-up in perspective. The present study, therefore, represented an initial exploration of the utility of using a "top-down" perspective to examine attention allocation, as a part of a general cognitive model of attention. The results of the present investigation suggest that "top-down" attentional processes are operative in the reading process and appear to be fairly adequately self-regulated by average grade five readers. Thus, the initial investigation indicates that the

examination of "top-down" attentional processes in reading would be a viable research avenue, and that an integrative theory of attention in reading comprising "bottom-up" and "top-down" perspectives is essential.

Several recent attempts to outline an interactive model of reading (Rumelhart, 1977; Lesgold and Perfetti, 1978; Stanovich, 1980) hold considerable promise in this regard. An alternative way of deriving such a theory would be through an in-depth examination of the reader's attentional development from novice to expert as Brown (1978) has suggested. By studying beginning readers at various age levels, developmental aspects might be teased apart from those aspects that are critical to the optimization of attention in reading.

Attention and Learning Disability

There is a great deal of confusion in the literature concerning the notion of attention deficit as it relates to learning disability, the brunt of which appears to stem from conflicts arising out of hyperactivity versus learning disability literature (Ross, 1976; Douglas and Peters, 1979) and structural versus process issues (Torgesen, 1975). The argument essentially rests on the contention that attention deficit is a constitutional predisposition for only hyperactive groups and is really a secondary symptom for the learning disabled (Douglas and Peters, 1979). They conclude that remedial efforts focusing on attentional training are suitable only for hyperactive groups and remediation for learning disabled in general should be directed at the student's primary learning deficits. The counter-argument is

advanced by Ross (1976) who maintains that all learning disabilities (including hyperactivity) are due to a generalized developmental lag in one's capacity to employ and sustain selective attention. He proposes that adaptive attentional training would be helpful for learning disabled and hyperactive groups.

The results here do appear to favor Ross (1976) in that adaptive attentional instructions and training on a reading task were highly successful for this particular subgroup of learning disabled readers. With respect to the earlier discussion of structural versus process issues in learning and development, the ready improvement of the reading proficiency of the disabled readers under differential instructional conditions would suggest that the attentional problem here was attributable to inadequate control processes as opposed to an actual structural attention deficit.

The issue is far from being resolved at this point. It would, however, appear that the present research perspective and paradigm would be a useful framework within which continued efforts at resolution of the issue can be channelled.

The Zone of Potential Development

Psychologists have acknowledged the importance of attention as a basic psychological process since the beginning of the century. Though there appears to be a consensus that the process undergoes considerable change over development, very little is known about how attention became actualized and optimally controlled over the course of development. Vygotsky's (1963, 1978) theory of the zone of

potential development was referred to in the introduction as a useful framework for the simultaneous examination of structural versus control aspects of attention development. Two features of the zone of potential development theory were pertinent to the present investigation. The first was that Vygotsky (1963) specifies the existence of both a zone of actual development as well as the zone of potential development. The latter zone represents the individual's potentiality for learning which precedes the attainment of specific mental functions or structures (i.e., zone of actual development). When we consider special groups such as the learning disabled, it is therefore conceivable to suggest that the mental structures (zone of actual development) for attentional self-regulation are impaired in the reading disabled or alternatively, that the latter zone is adequately developed and that they have not yet learned how to regulate or control the use of these structures (zone of potential development). The latter alternative was examined in the present study by the practical application of another feature of this theory; that peer or adult instruction constitutes the initial stage of learning.

Thus, the present investigation was designed to compare learning conditions which increased in the amount of other direction that was given to promote subjects to self-regulate their attention to use metacognitive processes during a silent reading task. Since the results indicated that disabled readers could improve their reading performance in the intentional instructional conditions, there is a substantial indication that the "attention deficit" notion that is often applied to learning disabled groups is a remediable problem that

falls within the zone of potential development. Therefore, it would appear that Vygotsky's (1963, 1978) theory can be suitably applied to help resolve structural versus control issues.

There was an additional advantage in the utilization of the Vygotskian theory which should be further noted at this time. By using instructional conditions of increasing other direction, it was possible to roughly gauge the type and amount of other direction necessary to access the zone of potential development of the disabled reader. For example, significant improvements in comprehension were obtained for the planned intentional condition, whereas an increased amount of other direction (i.e., trained intentional condition) was necessary to achieve a significant improvement in recall. Brown, Campione and Day (1981) who recently conducted a training study and similarly adopted a Vygotskian framework, concluded that

> It is often not necessary to make explicit all the steps of learning and the need for transfer, and so forth. The degree to which it is necessary to make each step explicit is a measure of the child's zone of potential development or region of sensitivity to instruction. (p. 16)

If the interpretation of the Brown et al. (1981) and the present study is accurate, the theory would appear to have direct ramifications for school related applications. Overall, the framework was found to be useful for the purposes of the present investigation, and would be strongly recommended for use in similar type investigations of cognitive processes and/or different sample groups.

Limitations of the Study

1. The main purpose of this study was to examine the notion of attention deficit in disabled readers. Several investigations and theoretical perspectives were reviewed and integrated in an attempt to resolve several critical shortcomings of previous research efforts in this area. Thus, considering the exploratory nature of the study, the utility is primarily in identifying several avenues of potential significance for future investigation. Each of these areas now needs to be examined in depth, especially to guide the building of useful theoretical and applied perspectives.

2. The present investigation differed from the majority in that the reading groups (average and disabled) were matched according to reading level as opposed to age level. Even though this arrangement was highly successful for comparing attentional differences of average and disabled readers, two major aspects were affected by not having an age level comparison. The first instance was in the attempt to relate the present results to existing literature. It is not clear whether discrepant findings are a function of matching differences or of this particular subgroup of disabled readers. Additionally, by not having an age level control group to compare the disabled readers' performance gains to, it was impossible to gauge how closely their improved performance approximated that of the average grade seven reader (i.e., the upper limits of the zone of potential development). Therefore, future investigations should include both reading and age level matched groups to maximize the interpretive value of research results.

3. Comprehension measures were included in the present investigation with the surprising result of differential improvement in comparison with recall over learning conditions for disabled readers. The implications of these results are that comprehension and recall are two independent processes that play a significant role in the development of reading proficiency. Future research should specifically focus upon the further delineation of the two processes, and particular attention should be given to the quality and type of questions that are devised and used.

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APPENDICES

APPENDIX A

COMPREHENSION QUESTIONS

APPENDIX A

COMPREHENSION QUESTIONS

1. Where was the dragon's home?
2. How did the children feel when they were told about the dragon?
3. Why did the little boy go to the dragon's home?
4. When did he set out on his journey?
5. How did the dragon respond to the invitation?
6. How would you describe the character of the little boy?
7. How did the boy and the dragon travel back to the boy's home?
8. What strange change occurred?
9. How would the dragon feel about the change?
10. Why did he feel this way?

APPENDIX B

THE DRAGON'S TEARS

APPENDIX B

THE DRAGON'S TEARS

	Importance Rate	Level of Importance
1 Far away in a strange country	2.11	2
2 there lived a dragon,	3.41	4
3 and the dragon's home was in a deep mountain cave.	2.15	2
4 From the cave his eyes shone out like headlights.	1.26	1
5 Very often, when the people living nearby	2.07	2
6 were gathered in the evening by the fire,	1.67	1
7 one would say: "What a terrible dragon is living near us!"	2.44	3
8 And another would agree, saying: "Someone should kill him."	1.59	1
9 Whenever children were told about the dragon,	2.85	3
10 they were frightened.	3.11	3
11 But there was one little boy who was never frightened.	3.85	4
12 All the neighbors said: "Isn't he a funny little boy?"	1.44	1
13 When it was almost time for this funny little boy's birthday,	2.52	3
14 his mother asked him: "Whom would you like to invite for your birthday party?"	3.74	4

15 Then that little boy said: "Mother, I would like to ask the dragon."	3.67	4
16 His mother was very much surprised and asked: "Are you joking?"	1.70	1
17 "No," said the little boy very seriously,	1.52	1
18 "I mean what I say;	1.59	1
19 I want to invite the dragon."	2.11	2
20 And, sure enough,	1.15	1
21 on the day before his birthday,	2.37	2
22 the little boy stole quietly out of his house,	2.67	3
23 He walked and he walked and he walked	2.44	3
24 till he reached the mountain where the dragon lived.	3.19	3
25 "Hello, Hello. Mr. Dragon."	3.04	3
26 the little boy called down the valley in his loudest voice.	1.82	2
27 "What's the matter?	1.22	1
28 Who's calling me?"	2.82	3
29 rumbled the dragon,	2.26	2
30 coming out of his cave.	1.52	1
31 Then the little boy said: "Tomorrow is my birthday	3.56	4
32 and there will be lots of good things to eat,	1.52	1
33 so please come to my party.	3.82	4

34 I came all the way to invite you."	1.85	2
35 At first the dragon couldn't believe his ears	3.07	3
36 and kept roaring at the boy.	2.52	3
37 But the boy wasn't frightened at all	2.48	3
38 and kept saying: "Please, Mr. Dragon, please come to my party."	2.41	2
39 Finally the dragon understood that the boy meant what he said	3.26	4
40 and was actually asking him,	2.11	2
41 a dragon,	1.22	1
42 to his birthday party.	1.96	2
43 Then the dragon stopped roaring and began to cry.	3.41	4
44 "What a happy thing to happen to me." the dragon sobbed.	2.74	3
45 "I never had a kind invitation from anyone before."	2.89	3
46 The dragon's tears flowed and flowed	3.22	4
47 until at last they became a river.	2.96	3
48 Then the dragon said:	1.82	2
49 "Come, climb on my back and I'll give you a ride home."	3.37	4
50 The boy climbed bravely onto the back of the ferocious dragon	3.04	3
51 and away the dragon went,	2.30	2

52 swimming down the river of his own tears.	3.26	4
53 But as he went,	1.89	2
54 by some magic,	2.26	2
55 his body changed its size and shape.	3.22	4
56 And suddenly —	1.82	2
57 what do you know! —	1.22	1
58 the little boy was sailing bravely down the river toward home	3.70	4
59 as captain of a dragon-steamboat!	3.70	4

APPENDIX C

PRE-TASK INTERVIEW QUESTIONS FOR THE PLANNED INTENTIONAL GROUP

ORIGINAL PRE-TASK INTERVIEW QUESTIONS FOR THE PLANNED INTENTIONAL GROUP

* 1. What do you do when you read in preparation for a test?

* 2. Is there anything that you can do to make what you are reading easier to remember?

* 3. How would you find the name of a place in a story?

* 4. How would you remember a story so that you could tell it to a friend later?

* 5. How much of the story would you remember?

* 6. How would you think of a title for a story?

7. How can you make sure that you are following the story correctly as you read?

8. What kind of information do you look for when you read?

9. I am going to ask you to read a folk tale for me. What kinds of information would you expect to find in the story?

10. What will you do to make sure that you remember as much of the folk story as you can?

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* From Forrest and Waller (1980).

REVISED PRE-TASK INTERVIEW QUESTIONS FOR THE PLANNED INTENTIONAL GROUP

1. What do you do when you read in preparation for a test?
2. Is there anything that you can do to make what you are reading easier to remember?
3. How would you remember a story so that you could tell it to a friend later on?
4. How much of the story would you remember?
5. How would you think of a title for a story?
6. How can you make sure that you are following the story correctly as you read?
7. What kind of information do you look for when you read?
8. I am going to ask you to read a folk tale for me. What kinds of information would you expect to find in the story?
9. What will you do to make sure that you remember as much of the folk story as you can?

APPENDIX D

THE ADAPTED SQ3R APPROACH FOR THE TRAINED INTENTIONAL CONDITION

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Survey — First look at the title to get an idea of what the story is about. Then in about 15 seconds glance over the story to pick out some of the key information around which the rest of the story will cluster. Also, this orientation will help you to organize your attention as you read through the rest of the story.

Question — Now begin to work. Turn the title into a question. Try to bring to mind information already known, thus helping you to understand the story more quickly. Continue to ask yourself questions on how the story parts relate to the part you are reading. This will make important points stand out while explanatory details are recognized as such. It takes a conscious effort on the part of the reader to ask useful questions, for which he must read to find the answer.

Read — Read to answer your own questions. This is not a passive plowing along each line, but an active search for the answer.

Recite — When you have read a portion of the story, look away from the book and try to briefly summarize the answers to your questions and the main ideas of the story to that point. Use your own words. Briefly glance over the section again to see if all the major points were identified. Repeat this procedure until all portions of the story have been read.

Review — After you have read the whole story, check your memory as to the content by reciting the major events of the story. Check to see that you haven't left out anything important before testing the final recall.

APPENDIX E

TRAINING SESSION STORIES

THE FATHER, HIS SON, AND THEIR DONKEY

A father and his son were taking their donkey to town to sell him at the marketplace. They had not gone a great distance, when they met a group of pretty maidens who were returning from the town. The young girls were talking and laughing when one of them cried out, "Look there. Did you ever see such fools, to be walking alongside the donkey when they might be riding it?" The father, when he heard this, told his son to get up on the donkey, and he continued to stroll along merrily.

They traveled a little further down the road, and soon came upon a group of old men talking. "There," said one of them, "that proves what I was saying. What respect is shown to old age these days? Do you see that idle young boy riding the donkey, while his father has to walk? You should get down and let your father ride!" Upon this the son got down from the donkey and the father took his place.

They had not gone far when they happened upon a group of women and children. "Why, you lazy old fellow, you should be ashamed," cried several women at once. "How can you ride upon the beast, when that poor little boy can hardly keep up with you?" So the good-natured father hoisted his son up behind him.

By now they had almost reached the town. "Tell me friend," said a townsman, "is that donkey your own?"

"Why yes," said the father.

"I would not have thought so," said the other, "by the way you overwork him. Why, you two are strong and are better able to carry the

poor beast than he is to carry you."

"Anything to please you sir," said the father, "we can only try." So he and his son got down from the donkey. They tied the animal's legs together, and taking a pole, tried to carry him on their shoulders over a bridge that led to the marketplace. This was such an odd sight that crowds of people gathered around to see it, and to laugh at it. The donkey, not liking to be tied, kicked so ferociously that he broke the rope, tumbled off the pole into the water, and scrambled away into the thicket.

With this, the father and his son hung down their heads and made their way home again, having learned that by trying to please everybody, they had pleased nobody, and lost the donkey too.

THE KETTLE THAT WOULD NOT WALK

One day as he was leaving for the market, a man's wife said to him, "Husband, since we need a new iron kettle for the fireplace, would you please remember to buy one?" So the man purchased a kettle at the market and toward dusk he took it on his arm and started for home. But the kettle was a heavy burden and his arm grew tired with carrying it and he set it down.

While he was resting he noticed that the kettle had three legs and scolding it said, "What a pity I did not see those legs before! Here you have three legs and I have only two, and yet I have been carrying you. Well, you shall take me the rest of the way." Then he nestled himself inside the kettle and said, "Now go on; I am all ready to be taken home." But the kettle stood stationary on its three legs and would not budget.

"Ah!" said the man, "you are a stubborn little kettle, are you? You want me to keep on carrying you, I suppose; but I will not. I will tell you the way and you can stay where you are until you choose to follow me." So the man gave the kettle directions to his house and then proceeded on his way.

Soon he reached home. His wife asked him where the kettle was. "Oh, it will be along soon," he replied. She was puzzled by his answer. He explained, "the kettle I bought has three legs, and was better able to walk here from the market than I who have but two legs. When I noticed its legs I immediately put it down on the ground and instructed it to walk the rest of the way itself. I wasn't about to

carry that kettle any farther."

"You need not worry, dear wife," said the man, "for I told it the way, and it will be along soon."

"Exactly where did you leave it?" inquired the anxious wife.

"At the bridge," he replied.

She was not so sure about its coming as he was and she hurried off to get it. When she brought it home the man said, "I am glad you have brought it home safely, wife. I have been thinking that it might have taken a notion to walk back to the market if we had left it unattended much longer.

HOW TO FOOL A CAT

Once upon a time there was a rich lord who liked to collect carvings of animals (those are like little wooden dolls). He had many kinds, but he had no carved mouse. So he called two skilled carvers to him and said: "I want each of you to carve a mouse for me. I want them to be so life-like that my cat will think they're real mice and pounce on them. We'll put them together and see which mouse the cat pounces on first. To the carver of that mouse I'll give this bag of gold." So the two carvers went back to their homes and set to work.

After a time they came back. One had carved a wonderful mouse out of wood. It was so well done that it looked exactly like a mouse. The other, however, had done very badly. He had used some material that flaked and looked funny. It didn't look like a mouse at all.

"What's this?" said the lord. "This wooden mouse is a marvelous piece of caring but this other mouse—if it is indeed supposed to be a mouse—wouldn't fool anyone, let along a cat."

"Let the cat be brought in," said the second carver. "The cat can decide which is the better mouse."

The lord thought this was rather silly, but he ordered the cat to be brought it. No sooner had it come into the room than it pounced upon the badly carved mouse and paid no attention at all to the one that was carved so well. There was nothing for the lord to do but give the gold to the unskilled carver but as he did so he said: "Well, now that you have the gold, tell me how you did it?"

"It was easy, my lord," said the man, "I didn't carve my

mouse from wood. I carved it from dried fish. That's why the cat pounced upon it swiftly."

When the lord heard how the cat and everyone else had been fooled, he could not help laughing, and soon everyone in the entire court was holding his sides with laughter. "Well," said the lord finally, "then I'll have to give two bags of gold, one to the workman who carved so well, and one to you who carved so cleverly. I'll keep the wooden mouse, and we'll let the cat have the other one."

SQUIRE'S BRIDE

Once there was a squire who was very very wealthy. He had everything he wanted except a wife. One day the squire saw a young maid working in a hayfield. He liked her and was sure she would want to marry him at once because he was so rich, so he told her that he wanted her to be his wife.

"No, thank you, but that's not to my liking," she said as she looked at his bald head.

But the squire was very stubborn, so he sent for the maid's father and told him that if he could arrange this marriage he would give the man much gold. "Yes, you may be sure I'll bring my daughter to her senses," said the father. "She is only a child, and doesn't know what's best for her." But all his talking did not help for his daughter was also very stubborn. The father knew no other way to keep his promise to the squire but to trick his daughter. He would have the girl sent to the squire's farm as though she were needed for some farm work. When she arrived a wedding would be waiting and she and the squire would be married right away.

The squire thought this was well and good so he prepared for a grand wedding and then sent one of his farm lads to fetch what he had been promised. So the lad ran off toward the farmer's house and found the daughter raking hay in a nearby meadow. "I am to fetch what your father has promised the squire," said the lad.

"So that is what they are up to," she thought to herself.

"I suppose he wants that little pony of ours," she said. With

this, the boy jumped on the back of the pony and rode home at full speed.

The boy soon arrived at the squire's house where the women were waiting to dress the bride for the wedding. The women fell into laughter when they saw the pony. They decided the squire wanted to make his guests laugh so they dressed the pony, crown and all.

"Very well, bring her in!" said the squire. "I am ready."

There was a terrible clatter in the hall, for the bride, as you know, did not wear silken shoes. When the door was opened and the squire's bride entered, everyone laughed. As for the squire, he had enough of that bride, and they say he never went courting again.

APPENDIX F

ANOVA'S FOR SEX DIFFERENCES IN RECALL AND COMPREHENSION

ANOVA for Sex Differences in Recall

Source	df	MS	F	p
Between				
Groups	1	.064	.0017	NS
Sex	1	.029	.0008	NS
Conditions	3	149.6	4.02	Sig
Groups x Sex	1	.471	.012	NS
Sex x Conditions	3	12.2	.329	NS
Groups x Conditions	3	94.9	2.55	NS
Groups x Sex x Conditions	3	11.8	.317	NS
Error	104	37.5		

ANOVA for Sex Differences in Comprehension

Source	df	MS	F	p
Between				
Groups	1	.152	.071	NS
Sex	1	3.25	1.15	NS
Conditions	3	6.51	3.02	Sig
Groups x Sex	1	3.25	1.15	NS
Sex x Conditions	3	2.23	1.03	NS
Groups x Conditions	3	7.09	3.30	Sig
Groups x Sex x Conditions	3	.637	.296	NS
Error	104			

APPENDIX G

SUMMARY OF PRE-TASK INTERVIEW RESPONSES

SUMMARY OF PRE-TASK INTERVIEW RESPONSES

	Average	Disabled
1. What do you do when you read in preparation for a test?		
- study the hard words	✓	
- use the dictionary	✓	
- review - read it over	✓✓✓✓✓✓✓✓✓	✓✓✓✓✓✓✓✓✓
study	✓✓✓✓	
memorize	✓✓	✓✓✓
- sound the words out	✓✓	
- make notes	✓✓	✓✓✓✓✓
- if it's long I do it step by step	✓	
- read it out loud to someone	✓	✓
- study (read) the parts I don't know	✓✓✓	✓
- go to a quiet room		✓✓
- look over the words they have in italics (they're important)		✓
- think out the problems		✓✓
- ask myself questions about it and answer them		✓
- read the important parts and try to remember them.		✓
2. Is there anything that you can do to make what you are reading easier to remember?		
- don't know	✓	✓✓✓✓
- it's the same as spelling - say the word, cover it, then spell it	✓✓✓	
- read it more than once	✓✓✓✓✓✓✓✓	✓✓✓✓✓
- say it over, memorize it	✓	✓✓
- write it down	✓	✓✓✓✓
- do it more slowly	✓✓	✓
- sound it out	✓	✓
- ask someone	✓	
- read stuff you like to read - big books	✓	
- have someone test me		✓
- read easier books		✓
- read a little bit each day		✓
- read more		✓
- think of something that relates to the thing that I need to remember		✓

	Average	Disabled
3. How would you remember a story so that you could tell it to a friend later?		
- read it more than once	✓✓✓✓✓✓✓	✓✓✓✓✓✓✓✓✓✓
- read it carefully	✓✓✓	✓
- remember the most interesting (important) parts	✓✓	✓✓✓
- use the book summary on the cover	✓	
- ask someone to read it for me a few times	✓	
- remember the characters	✓	
- make notes	✓	✓
- memorize it	✓	✓✓
- start with the main idea	✓	
- remember the different parts		✓
- say it over		✓✓
- copy it down		✓✓
- think in my mind what the story said		✓✓✓
- maybe it just comes natural		✓
- summarize it		✓
4. How much of the story would you remember?		
- almost the whole thing	✓✓✓✓✓	✓✓✓
- about 1/2	✓✓✓✓✓	✓✓✓✓✓✓
- the exciting and boring parts, conversation	✓	
- 3/4	✓✓	✓
- most important stuff	✓	
- I might skip some of the details	✓	
- about 3 or 4 chapters		✓
- the beginning and the end		
- depends on how long it is		✓✓
- the middle part		✓
- I might even add some stuff to make it more interesting sometimes		✓
- the end and the middle		✓

	Average	Disabled
5. How would you think of a title for a story?		
- by what it's about	✓✓✓✓✓✓	✓✓✓✓✓
- how it might happen in the story	✓✓✓	✓
- read and find your main idea	✓	
- about the character I'm talking about	✓	
- I'd think of it interesting and curious	✓	
- figure out what would go with the story	✓	
- read the story over and think up a title	✓✓✓✓✓	✓✓✓
- what was more written about, who was in the story more than others and what it is	✓	
- when it has something to do with the story		✓
- try to find the main part		✓
- if it's good		✓
- I don't know		✓
6. How can you make sure that you are following the story correctly as you read?		
- don't know	✓	✓✓
- just follow along	✓	✓
- go along carefully (slowly)	✓✓✓✓✓✓	✓
- listen how they sound the words	✓	
- it won't make sense, make sure it makes sense	✓✓✓	✓✓
- follow with pencil or finger, paper, marker	✓✓✓✓	✓✓✓✓
- read it over	✓✓✓	✓✓
- ask someone		✓✓
- read the summary on the cover		✓
- try to picture the story in my mind		✓
- by punctuation		✓
- using the dictionary if you don't know a word		✓

	Average	Disabled
7. What kind of information do you look for when you read?		
- where the story takes place	✓✓✓	✓
- depends on the words, what kind of word it is	✓	✓
- things that interest people	✓✓	✓
- things that give people information	✓✓	
- setting	✓	
- when it takes place	✓	
- excitement, interesting parts, conversations	✓✓	✓✓✓
- if it's a word I don't know, I use the dictionary	✓	
- if it's a report I take out books on a certain person or animal	✓	
- people's names, who it's about	✓✓	✓✓✓✓✓
- what it's all about, what happens	✓✓	✓✓✓✓✓✓
- what they are doing	✓✓✓	✓
- the most important facts	✓✓✓	✓✓✓
- I look for the answers	✓	✓
- periods and all those other signs	✓	
- horror		✓
- how things happen		✓✓
8. I am going to ask you to read a folk tale for me. What kinds of information would you expect to find in the story?		
- don't know	✓✓	✓✓
- things that aren't true	✓✓✓✓✓	✓✓✓✓
- a tale	✓	
- a lesson to be learned	✓✓✓	
- if there's any adventure, mystery or just happy stuff or sad stuff, funny	✓✓	✓✓✓
- who was in it	✓	✓✓
- why something happened	✓✓	
- things you can't ever do in real life	✓✓	
- about a witch	✓	
- what happens	✓✓	✓✓✓
- I don't know what a folk tale is	✓	
- how she does it	✓	
- about folks, about old people		✓✓
- description of the character, what's so important about him		✓
- about the past		✓✓
- where the story happens		✓✓
- superstition		✓

	Average	Disabled
9. What will you do to make sure that you remember as much of the story as you can?		
- after I read a sentence, try to repeat it in my head	✓	
- read it carefully, slowly	✓✓✓✓✓✓	✓
- sound out the words	✓	
- read it over	✓✓✓✓✓✓✓✓	✓✓✓✓✓✓✓✓✓✓
- just think of it, not anything else	✓	
- by the title and parts of the story	✓	
- the lesson to be learned	✓	
- pay attention to it	✓	
- put some action to it	✓	
- try to keep track of what I read	✓	
- think of the characters, remember their names	✓	
- think of it in my mind and go back to it	✓	✓✓
- read over the part I wouldn't remember		✓
- skim after I read it, and then read some of the important parts again		✓
- try to think of it all the time so I can remember it		✓✓
- make a rough copy, write it down		✓✓
- read over the important parts		✓

APPENDIX H

FREQUENCY OF BEHAVIORS OBSERVED DURING SILENT READING

FREQUENCY OF BEHAVIORS OBSERVED DURING SILENT READING

Behavior	Reading Group	Incidental Condition	Intentional Condition	Planned Intentional Condition	Trained Intentional Condition
Moving lips, subvocalizing	Average	***	***	******	***
	Disabled	******	****	****	***
Holding pages up off table, closer to eyes	Average	****** ****	****** **	******	****
	Disabled	****** ***	****** *****	****** ***	****** ***
Head moving left to right during reading	Average	****	******	******	
	Disabled	****** **	****** *	****** ***	******
Using finger as a guide for reading place	Average				**
	Disabled	*		*	
Initial scanning of story	Average				******
	Disabled			*	****
Lifting head or looking away from text during reading (rehearsal)	Average				****** **
	Disabled			*	*****
Referring back to story parts after reading through the passage	Average			**	***
	Disabled		**	*	****** *****